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Scale Growth Rate of the Common Goby Assured by the Lead-acetate Injection Method*

Ryushi Ichikawa and Yoshio Hiyama
(Fisheries Institute, Faculty of Agriculture, Tokyo University)

Introduction

In falls of 1951 and 1952, the tagging experiments of the common goby were done in Tokyo Bay, and to a part of these fishes the method to mark the time on growing scale by lead-acetate, introduced by Hiyama and Ichikawa (1952) based on the method by Okada and Mimura (1938), was applied. About the feature of lead deposition in the scales of the fishes recaptured in the former year, we already reported in the previous paper (1952), and about the survival rate of the tag bearers and the injected fish we wrote in another paper (1953). After then, Ichikawa could improve the method to develop lead mark more clearly enough to be able to see it by surface observation, which had required the cross section for the exact observation previously. Therefore, by the measurement of the grown part outer from the lead line, here we could obtain the exact estimation of the growth rate, such as the number of circuli formed in a day, the season when the change of zone occurs and others.

Tagging Experiment

On 4th and 10th of October, 1952, 978 individuals of the Common Goby (*Acanthogobius flavimanus*) were tagged by nylon string and celluloid plate, in them 351 were injected at that time by 0.1 cc of 0.1% lead-acetate solution per 10 grms of body weight, and liberated in Tokyo Bay. The recovery of the tagging experiment is 57 in total, among which 24 are found to be injected by lead acetate, by examining the number in celluloid plate which was recorded in the field note book. The one individual in 24 was reported by the tag only, and no specimens we could obtained.

So, 23 specimens altogether were the material examined.

The method of examination

23 individuals thus obtained had been preserved in 10% solution of formalin during about three months. And the scales taken from them were treated as follows to make lead line enough to be recognised by transparent light under microscope. This time the method of treatment is slightly improved from the method already mentioned (Hiyama & Ichikawa 1952) as to get lead line more conspicuous, enough to observe it by surface view, without making the cross section. The improved method is as follows.

(1) Scales are immerged into 1% solution of HCl, contenuously saturated by H_2S

* 本研究は文部省科学研究費の一部による。

gas from the generater, during two hours. (2) After that, washing by water, and immerged into 0.05% solution of $AuCl_3$ during two hours. (3) Then, washed by 0.5% solution of Sodium-thiosulphate during 5 minutes.

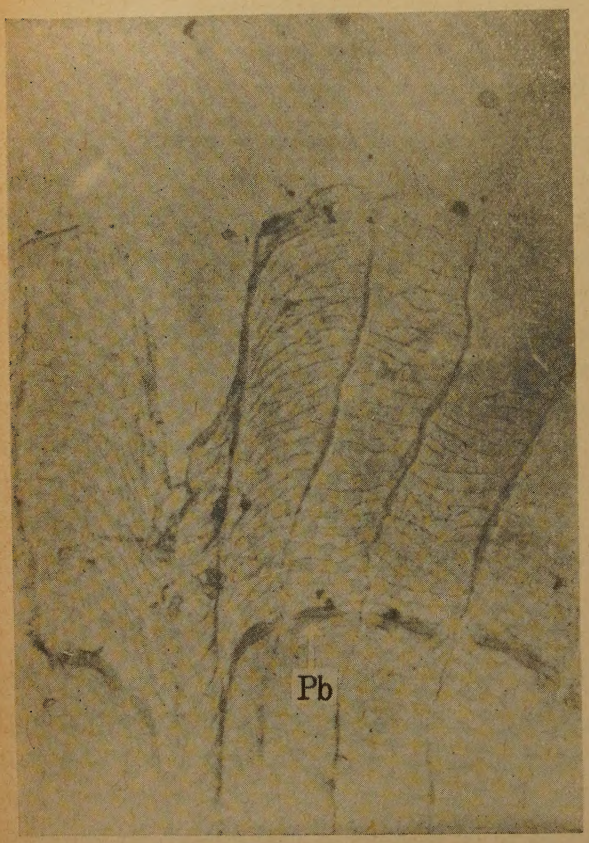

Fig. The lead line (Pb) on the scale of the fish which was recaptured on the 71st day since liberation.

The main differences of the treatment from the former method are the precence of 1% solution of HCl during sulphuration, and more dilute and longer treatment of $AuCl_3$ during the gilting. By this way; as shown in the Photo here inserted, by the surface observation, a clear blue line appeared under microscope in scales of 18 specimens. And, as already mentioned in the preceeding paper (HIYAMA & ICHIKAWA 1952), the line can be interpreted to denote the location of growing part made when the fish was injected.

The measurement of grown part

Therefore, the peripheral part of the scale outer than this blue lead line is certainely a part which have formed since the injection and the liberation. It is already reported by MIYAZAKI (1940) that the scale of this species has the Winter zone as a zone having wider interval of circuli and the Summer zone as a zone having narrower interval of circuli. And the same fact is already confirmed by the seasonal change of the feature of the margin of scale by HIYAMA and the collegues (unpublished).

As the injection was done at the beginning of October (4th and 10th), the blue lead mark appeared in the Winter zone having the wider intervals of circuli.

As shown in Table, the member of circuli which exists in the part outer than lead mark, i. e. grown part since the injection, was counted. And, by dividing it by the number of days passed from the day when injected up to the day of recapture, the number of circuli formed in a day can be enumerated.

On the other hand, the number of circuli exist between the lead line and the end (the outer most part) of Summer zone was counted. So, by the growth rate got by the method mentioned above, it is able to assume that how many days had passed since the formation of the end of Summer zone up to the day when the fish was

injected. Thus, since already the date of the injection (i. e. the tagging and the liberation) is known, it is able to assume the day when the feature of circuli turned from the Summer type to the Winter type.

As shown in Table, it is from 1st to 30th of September. This coincides nearly with that MIYAZAKI wrote that it happens during September and October.

As it is already well known, the growth rate differs between young fish and old one. So, the average growth rate is culculated for 0-year old fish and 1-year old one respectively. It is 0.41 circulus per day for 0-year class (14 individuals), and 0.27 for 1-year class (4 individuals).

This trial of estimation on the date of the feature change of scale is the first actual achievement that has ben already supposed by the method introduced by HIYAMA & ICHIKAWA (1952). As annuli in the scale is the similar character as this, this method would be appliable to any other sort of fish scale on which growth or identification of annuli any argument exists.

Table.

Date of liberation	Oct. 4	〃 10	〃 4	〃 10	〃 10	〃 4	〃 4	〃 4	〃 4	〃 4	〃 10	〃 4	〃 4	〃 4	〃 4	〃 4
Days from liberation to recovery	8	14	17	21	23	24	25	28	29	29	31	40	43	47	57	63	71	79
Number of newly formed circuli since liberation	2	9	5	9	10	8	10	16	8	9	10	16	12	18	20	32	25	18
Number of circuli formed in a day	*.25	.64	.30	.43	.43	.33	.40	.57	*.28	*.31	.32	.40	.28	.38	.35	.51	.35	*.23
Circuli between Pb-line and the end of Summer zone	7	8	7	7	7	7	8	6	9	7	10	7	8	4	7	2	10	7
Days assumed to form these circuli	28	12	24	16	16	21	20	11	33	23	31	18	29	10	20	4	28	31
Assumed date of the beginning of Winter zone	Sept. 6	〃 28	〃 10	〃 24	〃 24	〃 13	〃 14	〃 23	〃 1	〃 11	〃 3	〃 22	〃 5	〃 24	〃 14	〃 30	〃 6	〃 3

* denote one year old fish, and the others are 0 year old fishs.

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1

Editorial Notes

新 著 紹 介

Deraniyagala, P. E. P. A colored atlas of some vertebrates from Ceylon Vol. 1. Fishes. Ceylon National Museums Publication. Jan., 1952. 149 pp, 34 pls, 60 text-figs.

著者は Ceylon の National Museums (Museums と複数に書かれている) の長である。Ceylon 島産魚類の化石8種，現存のもの 129 種或は亜種を取扱つた。現存種は淡水産のものを主体とし少数の海産魚が加えてある，図版には37魚の生時の色彩が寫され，本文中の挿図もよく特徴が示されている。是等の図は何れも著者自身の手になつたものである。記載は簡単でもすむものは数行にまとめてある。二新亜種 *Labeo porcellus lankae*, *Anabas testudineus kavaiya* が発表されている。主要文献を挙げ，索引がつけてある。（富山一郎）

日本魚学振興会新着図書案内 No. 5

Breviora. Museum of Comparative Zoology (Harvard), nos. 3, 8. 1952.

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ヨシノボリ頭部の Sensory papillae に就いて

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（弘前大学文理学部生物学教室）

On the sensory papillae of a Japanese goby, *Rhinogobius similis* (GILL)

Mitsuo SATŌ

(Biological Laboratory, Faculty of Literature and Science, Hirosakj University)

ハゼ科 Gobiidae およびカジカ科 Cottidae 魚類の体表、主として頭部に白色いぼ状の小突起がみられる。これらの小突起物がここにいう sensory papillae であり、わが国にはこれについての報告がまだないようである。

ハゼ科魚類の1種であるヨシノボリの頭部にもこのような小突起が数多くあり、区眼的にすぐみとめられる (Fig. 1)。これらの小突起の大きさは個体によるちがいはもちろん、同一個体でも不同であるが、体長5 mm の個体の中位の小突起についていえば、基部の直径が 0.2mm 位、尖端部のそれは 0.05mm 位、高さは 0.08mm 位である。

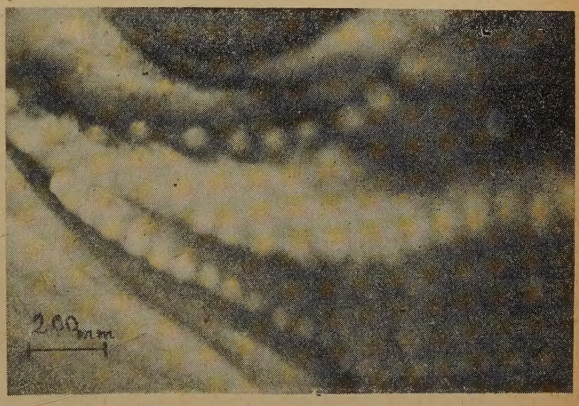

Fig. 1. Sensory papillae on the cheek.

ヨシノボリの小突起は体の長軸にほぼ平行してだいたい規則正しくならんでいる (Fig. 2, a, b)。すなわち AURICH (1938) の従列型に属する。彼によるとこの小突起の配列型がハゼ科魚類の分類の重要な一特徴になつているが、私に興味あるのはこの配列状態が側線管器のそれとよく似ていることである。たとえば眼の上下にある各1線 (sol, iol) はそれぞれ supraorbital および infraorbital line に、下顎部の2線 (oml, aoml) はそれぞれ operculo-mandibular line および accessory operculo-mandibular line に、鰓ぶたの3線 (uol, vol, lol) はそれぞれ upper, vertical, lower opercular line に相当する。もちろんこれは位置からのみ考えたことで、上の各線が同名の側線とそれぞれ同じ神経を受けているというのではない。このことについては今後の調査をまつて別の機会に報告したい。

小突起の組織学的構造を示したのが Fig. 3 である。断面にあらわれた小突起の形は、さきの少しくとがつた円屋根状で、このさきの部分にやや長みをおびた西洋ナシ形の細胞が 10 数個存在する。これらの細胞 (S) は特別な突出物とか感覚毛をもつていないようである。またこれらの細胞の内部にはエオジンに強く染まる粒が含まれている。このような細胞を感覚細胞と名ずけてよいかどうかはすぐ決められないが、恐らくそのような性質をもつものでないかと思われる。これらの細胞は多数の細長い細胞によつて囲まれている。この細長い細胞はほかの感覚器官の支持細胞にあたるものと思われる。小突起直下の真皮は小突起にむかつて隆起していて、この部分を通過して神経が小突起にはいりこむ。しかし神経が小突起のなかでどのように枝分れしているか、また西洋ナシ形の細胞とどのように連絡しているかはただいまのところ不明である。

上に述べたように小突起の組織学的構造は、側線管器特に皮下に沈没しないいわゆる大孔器 large pit organ にだいたい似ている。このことから直ちにこれらの小突起が側線管器と同じような機能をもつとは断定できないが、興味あることはヨシノボリの頭部に側線系に属する感覚器官は私の調べた限りではみとめられないのである。 BODENSTEIN (1882) によれば、カジカ科の1種 *Cottus gobio* の頭部にはこのような小突起のほかに側線管器がみとめられるので、小突起の存在と側線管器の有無との間に密接な関係があるとはいい得ないにしても、頭部にこの小突起が数多くみとめられる魚類は、一般に頭部の側線があまり発達していないように思われる。

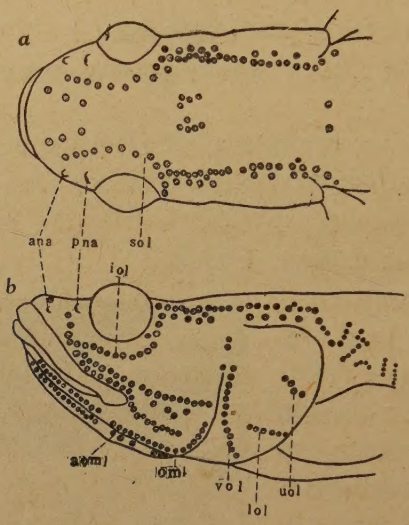

Fig. 2. Schema showing the arrangement of the sensory pspillae on the head. a, dorsal view; b, side view: ana, pna, anterior and posterior nasal aperture.

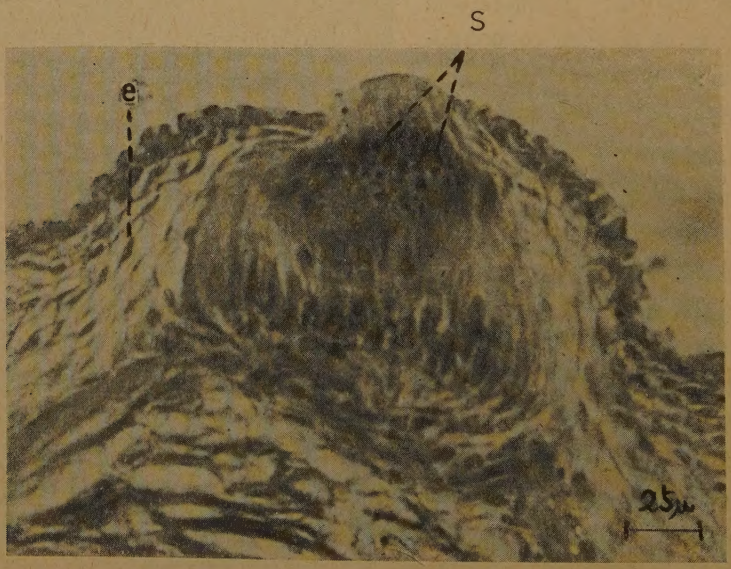

Fig. 3. Longitudinal section of thc sensory papilla on the head. e, epidermis; s, specialized cells.

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Résumé

This fish has sensory papillae on the skin of the head. These sensory papillae are easily detected as a whitish spot by the naked eye examination (fig. 1). Each papilla exhibits considerable variation in its size. In the specimen of 50 mm body-length, the papilla in the mid-size is about 0.2 mm in diameter in its base, 0.05 mm in diameter in its apex, and 0.08mm in its height. These papillae are arranged in definite lines in parallel with the long axis of the body: the pattern of arrangement of the papillae belongs to "the longitudinal type" named by AURICH (1938) (fig. 2 a, b). The histological structure of the papilla is shown in Fig. 3. The papilla projects prominent above the surrounding epidermis and has a dome-shape in its section. The specific cells with elongated pear-shaped form crowd closely in the outer portion of the papilla. These specifioc cells seem to be the sensory cells and be deprived of the cilia or sensory hairs. The specific cells are surrounded by extremely long cells which seem to be supporting cells. Each papilla is situated upon the corium which elevates upward the base of papilla and is penetrated by nerve fibres. These nerve fibres seem to reach to the above-mentioned specific cells, but the writer could not ascertain the relation between both. The writer's opinion about this question will be publised in accordance with hisfuture progress of investigation. It is interesting to note that these papillae seem to be generally prominent in such fishes as those equipped with poor canal line system.

A New Serranid Fish Found in Japan

Masao KATAYAMA
(Yamaguchi University)

By the courtesy of Mr. Shoji IGARASHI a number of species of fish obtained off Izu-Ōshima in October, 1952, came under my examination. Among them I found one interesting serranid fish not previously recorded from Japan. Upon careful examination of this fish, it was found that it represents a new genus and species which is described herein as *Giganthias immaculatus*.

I wish to express my gratitude to Prof. Kiyomatsu MATSUBARA for his kindness extended to me in various ways. I am also greatly indebted to Mr. IGARASHI for his favour of the valuable specimen.

Giganthias, new genus

Body oblong, compressed. Month large; a supplemental maxillary present; jaws with a broad band of villiform teeth and a patch of large conical teeth on tips of jaws and near the middle on sides of lower jaw; vomer, palatines and pharyngeal bones with villiform teeth; tongue rough, with many spinules. Preopercle finely serrated on both posterior and lower borders; opercle with three spines. Scales large and ctenoid; head scaled except for interorbital space, snout, preorbital, mandible and throat; soft portions of both dorsal and anal scaled at their bases. Lateral line complete and high; its tubes simple; no angle at the base of caudal peduncle. Dorsal fin not notched, with 9 spines and 13 rays; the spinous portion longer than the soft; the soft portion higher and rounded; dorsal spine strong; the fourth the longest; tip of the third spine expanded and the anterior and upper margin serrated. Anal short, with 3 spines and 8 rays; the soft portion rounded. Pectoral pointed and asymmetrical. Spine of ventral fin strong and with serrated tip as is the case with third dorsal spine.

Cranium broad and heavy. Base of cranium strongly curved. Frontal very broad, slightly convex, with a transverse ridge between posterior borders of orbits. Supraoccipital crest high and strong, not produced on the frontals. Myodome not opens posteriorly. Lower edge of urohyal with a large pointed projection, which directed forward. Branchiostegal rays 7; the last three rays lanceolate, the last one the broadest. Vertebrae 10+14+hypural=25; parapophysis developed from the sixth vertebra. Inner surface of oesophagus with many conical projections; pyloric coeca few. Air bladder simple.

Genotype: *Giganthias immaculatus*.

This genus is rather related to *Anthias* BLOCH, but differs from it in having the serrated tip of the third dorsal spine and the ventral fin spine, a patch of large conical teeth on the tip of jaws and near the middle on the sides of lower jaw, supplemental maxillary and nine dorsal spines.

From *Seleanthias* TANAKA it differs in having the serrated tip of the third dorsal

spine and the ventral fin spine, a patch of large conical teeth on the tip of jaws and near the middle on sides of lower jaw, forked caudal fin, no scales on interorbital space, and nine dorsal spines.

Giganthias immaculatus, new species
(new Japanese name: Mihara-hanadai)

Holotype.—KATAYAMA's Fish Coll. No. 1534, a minute female specimen, 252 mm in standard length, off Izu-Ōshima, collected by Mr. Shozi IGARASHI in October 1952.

Paratype.—K. F. C. No. 1535, 290 mm, date the same as holotype.

Description.—The counts and proportional measurements of bodily parts of the holotype and the paratype are shown in Table 1. Body oblong, compressed, dorsal and ventral outlines almost uniformly arched. Head compressed, shorter than depth of body, and with evenly and steeply curved profile. Eye large, high and entirely in the anterior half of head. Interorbital space slightly convex, broader than diameter of orbit. Two nostrils close together and directly in front of eye; the anterior one small, rounded, and with an elevated rim and a posterior flap; the posterior one large and elliptical. Month large and oblique; lower jaw very slightly projecting beyond the tip of upper jaw when the month is closed; maxillary expanded distally, extending a vertical through posterior border of pupil; a supplemental maxillary present (Fig. 3. H); villiform teeth in broad bands in each jaw, posterior teeth in each jaw

Table 1. Counts and proportional measurements in *Giganthias immaculatus*.

Items	Holotype (♀)	Paratype
Body length	252 mm	290 mm
Dorsal rays	IX, 13	IX, 13
Anal rays	III, 8	III, 8
Pectoral rays	16	16
Gill-rakers	10+20	10+21
Branchiostegal rays	7	7
Vertebrae	—	10+15
Pyloric coeca	—	10
Scales in lateral line	44	42
In body length:		
Head	2.96	2.09
Depth	2.42	2.31
Distance from ventral base to anal origin	2.77	2.90
Dist. from tip of snout to dorsal origin	2.71	2.68
Dist. from tip of snout to upper pectoral base	3.11	2.87
Dist. from tip of snout ventral base	2.69	2.59
Dist. from tip of snout to anal origin	1.48	1.45
Dist. from tip of snout to vent	1.58	1.56
Base of spinous dorsal portion	3.55	3.86
Base of soft dorsal portion	5.04	5.27
Base of anal	6.14	5.68

In head length:		
Snout	4.25	4.00
Eye	3.33	3.45
Interorbital space	2.74	2.63
Posterior part of head	2.02	2.04
Maxillary	1.88	1.85
Length of caudal peduncle	1.54	1.53
Depth of caudalpeduncle	2.42	2.35
Longest pectoral ray	1.16	1.31
Longest ventral ray	1.39	1.33
Length of ventral spine	2.02	2.22
Longest dorsal spine	3.26	2.98
Last dorsal spine	3.69	3.84
Longest soft dorsal ray	2.07	2.17
First anal spine	6.53	5.26
Second anal spine	3.40	3.33
Third anal spine	3.54	3.33
Longest anal ray	2.17	2.22
In eye diameter:		
Longest gill-raker	2.21	1.93
Longest gill filament	2.55	2.76

somewhat enlarged; a patch of large conical teeth on tip of jaws and near the middle on sides of lower jaw (Fig. 3. F. G.); vomer, palatines, and pharyngeal bones with villiform teeth; tongue rough, with many spinules. Preopercle finely serrated on both posterior and lower boders; subopercle and interopercle weakly serrated near the region of their union; opercle with three spines (Fig. 3. A.). Gill-rakers elongate, close-set and uniformly covered with many spinules on inner surface. Pseudobranchiae

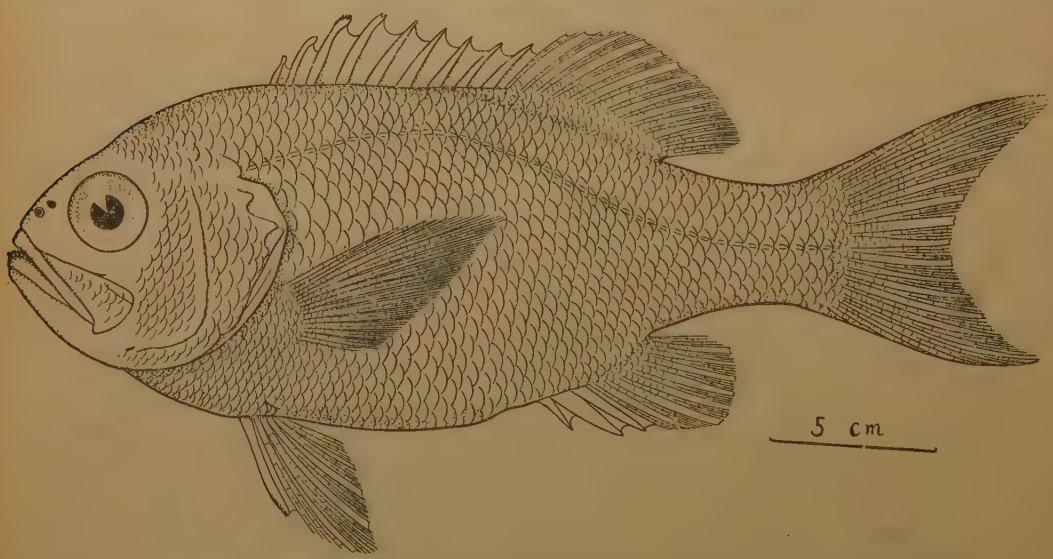

Fig. 1. *Giganthias immaculatus* in lateral view, from the holotype, 252 mm in standard length. Drawing by author.

well developed. Scales large, ctenoid; those 8 in a series from origin of dorsal to lateral line and 19 from origin of anal to lateral line; head scaled except for interorbital space, snout, preorbital, mandible and throat; soft portions of both dosal and anal scaled at their bases; caudal mostly covered with small scales. Lateral line high, complete, concurrent with back, ending at the base of caudal; anterior portion of the line substraight, with the highest point beneath the seventh spine of dorsal; its tubes simple.

Dorsal inserted over posterior end of opercular flap; no distinct notch between spinous and soft portions; the spinous portion longer than the soft; the soft portion higher and rounded; dorsal spine strong, the fourth the longest; tip of the third spine expanded and the anterior and upper margin serrated. Anal originated below base of fourth dorsal soft ray; anal short; spines very strong, the second and third spines subequal; the soft portion rounded. Pectoral pointed and asymmetrical, reaching to anus. Ventral inserted below lower end of base of pectoral; spine strong, with serrated tip. Caudal deeply forked.

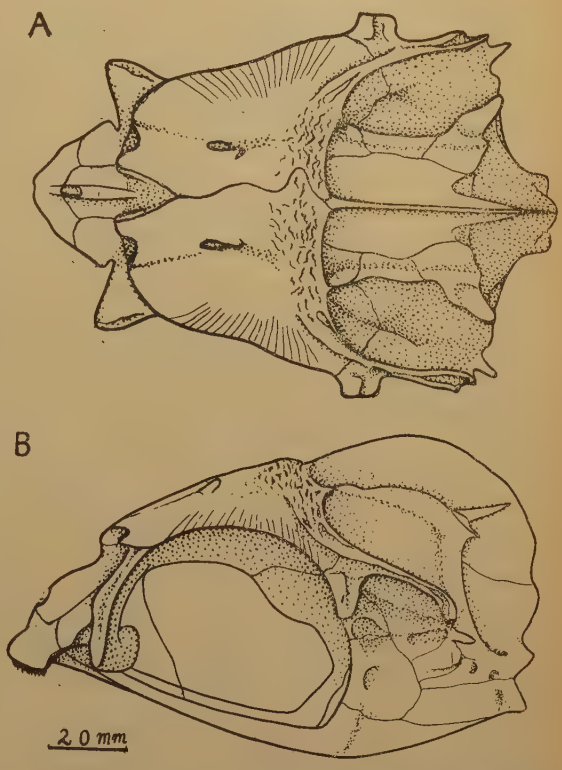

Fig. 2. Cranium of *Giganthias immaculatus* (290 mm in standard length). A, dorsal aspect; B, lateral aspect. Drawings by auther.

Cranium broad and heavy, the height about 1.63 in base of cranium, the width about 1.34. Base of cranium strongly curved. Frontals thick, interorbital space slightly convex and very broad, becoming wider posteriorly, the width at middle part about 1.76 in base of cranium; a transverse ridge between posterior borders of the orbits developed and anterior region of the ridge rugose. Supraoccipital crest high and strong, not produced onto frontals. (Fig. 2. A. B.) Myodome never opens to the exterior through a foramen, but the lower face of basioccipital with a pit. Urohyal large, longer than ceratohyal; the lower edge with a large pointed projection, which directed forward. (Fig. 3. D. E.) Branchiostegal rays 7; the last three rays lanceolate, the last one the broadest. (Fig. 3. B) Vertebrae 10+14+hypural=25; parapophysis developed from the sixth vertebra. Inner surface of oesophagus with many conical projections; pyloric coeca 10. Air bladder simple.

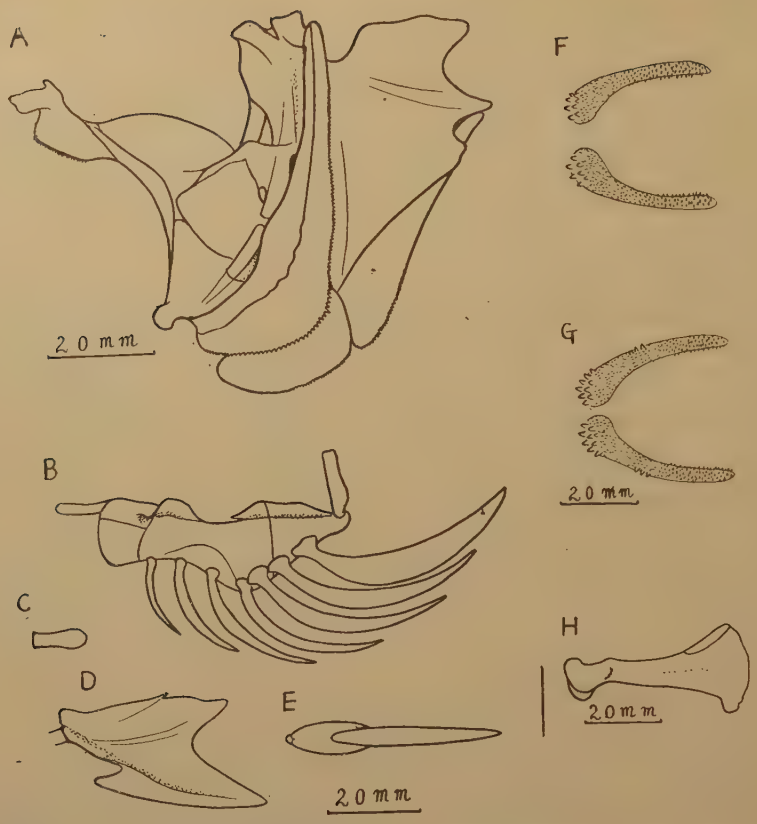

Fig. 3. Outline of left aspect of suspensorium (A), hyoid apparatus (B-E), teeth on upper (F) and lower (G) jaws and lateral aspect of maxillary and supplemented bone (H) in *Giganthias immaculatus*. B, lateral aspect of the hyoid apparatus; C, upper aspect of the glossohyal; D, lateral aspect of the urohyal. Drawings by auther.

Color in spirits purplish pinck, sides and below little paler and lower surface with bright silvery white reflections; a purplish pink streak from top of snout to lower border of eye; irregular yellow stops on spinous dorsal; other fins all pale.

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The First Appearance of a Deep-Sea Iniomous Fish, *Bathypterois atricolor antennatus* (GILBERT)* in Japan

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Recently Mr. Tamotsu IWAI kindly sent to me a fine specimen of a deep-sea iniomous fish belonging to the genus *Bathypterois*, which had been taken by the motor trawler on December 18, 1952 at a depth of about 170 hiro (about 258 meters) off Daiozaki, Mie Prefecture. The genus *Bathypterois* GÜNTHER contains about 11 species and 4 subspecies throughout the world (PARR, 1928: 25-27; PARR, 1934: 19), but no species has been found in the waters of Japan. The present specimen was in a good condition although the scales were mostly torn off and the tips of the rays in each pectoral fin were partly broken off. Upon careful examination, it was found identical with a Hawaiian species, *Bathypterois antennatus* GILBERT (GILBERT, 1905: 590, fig. 235) in spite of several significant discrepancies in characteristics and remoteness in locality from the type. This species, however, has since been considered to be a subspecies of the Indian species, *Bathypterois atricolor* ALCOCK (ALCOCK, 1896: 306; ALCOCK, 1899: 159), by PARR (PARR, 1928: 31). Since the publication of GILBERT's description and figure of this rare fish in 1905, the species has never been recorded in any part of the world except in Hawaii.

The present specimen is 148 mm. in standard length (175 mm. in total length), having the following counts and measurements:

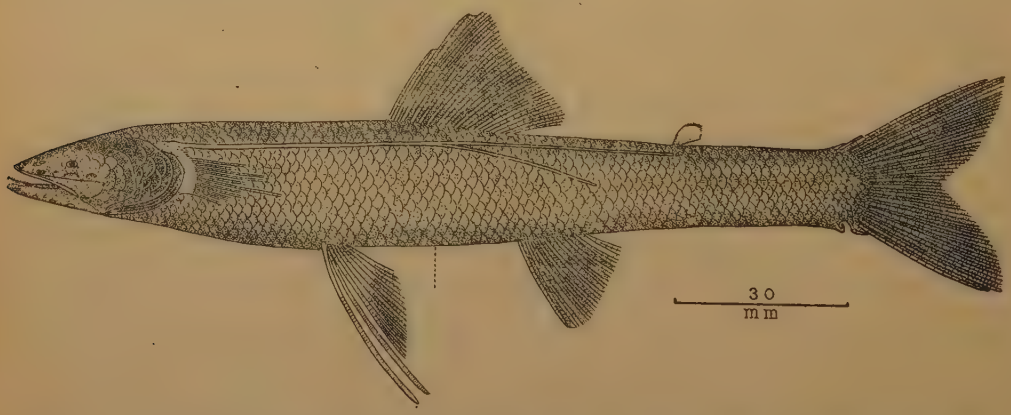

Fig. 1. *Bathypterois atricolor antennatus* (GILBERT) in lateral view, 148 mm. in standard length (MATSUBARA's Fish Coll. No. 20402). Drawn by author.

D. 14; A. 9; P. 2+4(rudimentary)+11; V. 2(simple)+7; C. 2 rudimentary)+19+2 (rudimentary). Scales in lateral line 61. Gill-rakers on outer arch 11+1 (at angle)+ 29=41. Head 4.82 in body length measured from tip of snout to base of lowermost developed caudal ray; greatest depth at the origin of ventral fin 6.73; distance from

* Itohiki-iwashi (New Japanese name)

tip of snout: to origin of dorsal fin 2.24, to origin of adipose dorsal fin 1.27, to origin of anal fin 1.65, to origin of ventral fin 2.63; length of caudal peduncle 3.25. Snout 3.34 in head measured from tip of snout to end of opercular flap; upper jaw 1.86; eye diameter 15.35; interorbital space 2.74; depth of caudal peduncle 2.22; base of dorsal fin 1.38; same of anal fin 2.56; ventral fin 0.95; longest dorsal ray (3rd one) 1.23; longest anal ray (2nd one) 1.73.

The present specimen is discrepant from the holotype of GILBERT's species in description in some important points: Teeth minute, in a rarrow band both on premaxillary and mandible; minute asperities covering nearly entire surface of vomer (teeth in a narrow hand on premaxillary and a wider band in the mandible, and a few minute asperities covering in a patch on each side of the head of the vomer in holotype). Gill-rakers on outer arch fewer, 41 instead of being 48 in the holotype. Origin of anal fin immediately behind a vertical from the end of base of dorsal fin (base of dorsal fin very slightly overlapping front of anal fin in the holotype). Origin of adipose fin slightly nearer base of dorsal fin than that of caudal fin, the distance from origin of adipose fin to base of caudal fin much longer than half the distance from the former to origin of dorsal fin (origin of adipose fin much nearer base of caudal fin than that of dorsal fin, and the distance from origin of adipose fin to base of caudal fin about one-third as long as the distance from the former to origin of dorsal fin in the holotype). Lower caudal lobe approximately as long as the upper (lower caudal lobe longer than the upper in the holotype). Four minute rays, though hardly visible with naked eyes, in upper portion of pectoral fin immediately below base of produced rays (1 in the holotype). Two outer ventral rays elongated, but falling short of origin of anal fin by a distance equal to width of maxillary (extending well beyond base of last anal ray in the holotype). In formalin the back of body brownish black, but the sides and belly much paler; opercular region jet black; fins brownish black except for whitish pectoral fin (body uniformly brownish black, and the pectoral filaments and tips of outer ventral rays white in the holotype).

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駿河灣魚類追加及び訂正(第11)*

黒田長禮

Additions to the list of fishes of Suruga Bay (XI), with corrections

Nagamichi KURODA

20.' ユメザメ *Centroscymnus owstonii* GARMAN

1906年 GARMAN は駿河湾江ノ浦から記載したのであったが、筆者の不注意から駿河湾魚類分布目録(1951)から脱漏していた。夫故茲に改めて追加する。原記載に用いられた個体は只一点であることは FOWLER (1941)も証明している。角鮫科のもので、一見しての特徴は第1背鰭が短小で低く且つ後方に延びないこと、胸鰭も其内角が殆ど突出していないことにある。其他鱗が円形中凹で小柄のあることが特異とされる。

第1図 ユメザメ(江ノ浦産模式標品) *Centroscymnus owstonii* (GARMAN, 1913)

分布はその北限が房州小湊の深海(松原教授報)で、相模湾では大磯(阿部博士教示)、而して駿河湾では江の浦の外焼津、由比である(阿部氏教示)。

480'. クサビマンボウ *Ranzania makua* JENKINS

1952年8月9日伊豆三津水族館を参観したとき本種の幼魚の液漬標品を発見したので之を借用して調べてみた。採集地は三浦近海で、1951年8月に三津の漁師山本某なる人が漁獲し多少弱っていたものが水族館に入り間もなく斃死したのであるという。(主任花島治作氏談)

第2図 クサビマンボウ(クサビフグ) *Ranzania makua* 三津近海産(著者原図)

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* 追加第10は動・雑, vol. 61, no. 6, pp. 169~177 (1952).

魚の和名の前の番号は駿河湾魚類分布目録(1951)に追加の位置を示す。

測定—全長（C. 端迄）238mm.、体長231.3、吻長34、頭長87.5、眼下縁から口角中央と鰓孔とを結べる線迄の長さ2,5、頭の厚さ（眼後にて）32.2、眼徑15、体高（鰓孔部）61.4、体高（P.部）62、体高（最高部）63、体高（D. と A. の前部）48、P. 長36.8、D. 長45.8、A. 長44、C. 長6.7 D. 18、A. 17、C. 17、P. 14.

体色（三津産、1ヵ年液漬後の標品）——外観は一寸ソウダガツオを思い起す形態と色合である背面は濃黒褐色殆ど真黒に近い。眼より前方の3横帯は淡蒼灰色で帯の縁は灰褐色。眼に接する1帯も同様であるが、下方の縁に灰褐色の擬円点4個位ある。次の3帯はいずれも縁にこの円点を有する。体側中央には不判明な円大斑を示し、中央より後方のものは灰褐色が濃色となり、円も亦大形となる。是等の円斑間には淡銀灰白色の粗らき網状に近似する。そして背方上方にも5～6の灰銀蒼色帯を示す。腹方は無斑、恐らく生活時は銀白色であったろう。D. と A. とは前縁半黒く、後縁半白色。P. は大部分白く上縁は淡黒色。C. は灰色及び白色の部分があって先縁は稍々暗色となる。体側に側線様の隆起線があり、後方は消える。虹彩は此液漬にて白色その内外縁は蒼色で美しい。

分布—クサビマンボウ（田中博士、奇魚珍魚、p. 147, 1934 及び魚、p. 69, 1940 にて始めて命名された名、古くは同博士によりクサビフグと云った）は *R. makua* として 1895年 JENKINS がハワイのオアフ島パールハーバーの入口で H. KAPU の採集した全長 508mm. をタイプとして記載したのが最初とされる。第2標品は SNYDER が 1901 にホノルルで採集の全長 101.6 mm. のものであった。日本にあっては古く伊達伯蔵古画に出ているのが愛知県渥美郡赤羽根村沖での漁獲品を写したものとなっている。其他田中博士通信では 20 年前位に相模湾国府津海岸で2尾（240 mm. 位）が獲られたという。四国では蒲原教授（1950, p. 210）が全長 1000 mm. のものを報告され（これは戦災で焼け、其後は入手されないとの通信があった）、其他には日本の例は知られない。しかし阿部博士の話ではクサビマンボウもヤリマンボウも共に左程珍らしくはないとのこと。氏は屢々南方へ行かれるので伊豆諸島などで時々獲られたのを見られた由。海外では台湾、支那海、南洋及び印度洋から報告される。大西洋産とは同種説と別種説とがあり、その差は次の様に記される

JORDAN & SNYDER (1901) は *R. makua* は大西洋の *R. truncata* (RETZIUS) に比し眼の小なること、眼が口よりも上位に存し、且つ体軸よりも上方に存すること、〔*truncata* では口は眼と同一レベルにあり〕P. の位置が上位であること、D. の高さと A. の高さとが共により高いこと及び体色の差である。以上の諸点は日本の標品の例に全く一致する。一説には年齢により著しく形態と斑紋とを異にするといわれる。私の考察したところでは大西洋と太平洋産とは全く同一ではないらしく種としては同一種でも亜種的に異ると思われる。それで学名は *R. truncata makua* JENKINS とすべきかと思う。但し SMITH 教授（1949）は只1種と認め、学名には *R. typus* NARDO (1840) が正しいとしている。此事は私には今決定しかねる。

今回の標品はタイプ（パールハーバー産）の図と比較し非常によく似るが只幼魚のためか著しく体が細長い。両例を比較すると次の様になる。蒲原教授の図も細長い。

産地	全長	D.	A.	C.	P.	体長は頭長の	体長は体高の	頭長は眼徑の	頭長は吻長の	頭長はP長の
	mm									
パールハーバー	508	17	18	19	13	2.83	2.13	6	2.33	1.5
三津	238	18	17	17	14	2.64	3.67	5.83	2.57	2.37

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667.' リユウキユウウシノシタ *Trulla itina* Snyder

1952年8月6日志下海岸干湖の際ヌメリゴチ、ネズミゴチ、ヨウジウオ、アラメガレイ等と共に本種1尾を山内豊厚君が採集した。調査の結果は次の通り。

第3図 リユウキユウ ウシノシタ *Trulla itina*. 志下海岸採集(viii 1952)（著者原図）

全長 122mm., 体長 119, 体高 33. D. 107, A. 89, V. 4, 鱗列（鰓孔上角より尾鰭迄）90個。頭長は眼径の約7倍、体長は頭長の5.6倍、体長は体高の3.6倍。

活魚の新鮮色——頭部及び体の前1/7位は一なる淡色の灰オリーブ色、それに淡灰褐色の小斑を散在する。左向きのもので内臓部は特に外方からも暗褐色を呈している。体の後方6/7位は地色は淡紅灰色で、それに雲形或は不規則な12位の横帯状をした umber brown の帯があり、所々に不判明な銀灰色の小円点がある。虹彩は暗褐色。下眼の前方に1鼻孔が明在する、側線は3条明在し頭部で上中の2側線は枝を以て連続する。D., A. 及び V. は大体オリーブ色に少し黄を帯び、D. 及び A. の軸に2—3淡色部（銀白色）があり、そのため D. 及び A. に淡色の交互斑が現われる眼側鱗は櫛鱗、無眼側は勿論白色で、櫛鱗であるが弱く、両縁辺に帯汚黄色1条がある。

ゲンチョ（*Areliscus interruptes*〔Günther〕）と比するに次の相違点がある。（1）吻端がゲンチョやアカシタビラメでは薄く、尖り型、此標品ではササウシノシタの様に外形丸味があって厚

* 印の文献は見ていない。

味が多い。（2）D. 及び A. がゲンチョでは暗色が一様的であるが、此標品では淡色の交互斑が入ること。（3）鱗が著しく細かいこと。従って側線鱗90個（鰓孔上角から尾鰭迄の全部）を算え、ゲンチョの約 70 個、アカシタビラメの 70～75 個より著しく多いこと。（4）体色や斑紋はゲンチョに似るが、地色の淡紅色に富む点が異り、又アカシタビラメとは大いに異るもので、赤味が少いことと斑あることの諸点により *Areliscus* ではない。

次に蒲原教授（1952）の土佐国高岡郡宇佐の本種の1標品の測定では頭長は眼径の7.6倍、体長は頭長の5.1倍、体長は体高の3.6倍、鱗列 83 個となっていて、大体によく似ている。

リュウキュウウシノシタという名は古く田中博士の命名されたもので属名を読んでトルラとした書物もある。

分布——Snyder（1909）により沖繩から記載されたのが最初で、其他に鹿児島（Jordan, Tanaka & Snyder, 1913）と高知県宇佐（蒲原、高知大研、no. 3, p. 85, March 1952）とから報告され、今回駿河湾（沼津市志下）から知られ、これが最北分布地となった。

673." **スルガチゴダラ**（新称） *Physiculus jordani* Böhlke et Mead

上記両著者により Stanford Ichthyol. Bull., iv, p. 27 (1951) に始めて記載されたもので、其標品は Albatross 号が駿河湾沖で採集した只1点が知られるのみである。蒲原教授（1952）が御畳瀬市場で入手して記載のナガチゴダラ（*P. inbarbatum*）に非常に酷似するが、D. と A. の条数が多いこと・頭が僅に長広なこと・吻が長いこと・両眼間隔が広いこと及び P. と V. とが稍々後方に生ずること等で別種と認められる。詳細は「魚雑」iii, no. 1, pp. 36～38, figs. 1～2, 1953 参照。

目下の処駿河湾特産魚の一つと見られる。

次の種類は本目録から削除すべきことに決した。

613. **シワイカナゴ** *Hypoptychus dybowskii* Steindachner

削除の理由——岡田・松原：日本産魚類検索（1938）p. 391 に「日本海、静浦、Bay of Strielok,……」とあるので私は駿河湾目録に加えた。そして蒲原：土佐及び紀州の魚類（1950）, p. 272 にも「亜庭湾～静岡県静浦、紀州、……」となっている。昨年高木和徳氏から駿河湾の本種の標品を送附ありたき旨の通知に接し、私は上記の文献を引用したに過ぎないとお答しておいた。其後疑が多くなったので段々調べる内に Jordan, 田中及び Snyder, 1913, p. 403 を見ると、シワイカナゴ（*dybowskii*）の分布の中には静浦はなく、その代りアイイカナゴ（*H. steindachneri* Franz, 1910）のタイプロカリティーは "Fukuura" =神奈川県（相模湾）福浦（真鶴附近）となっているこれが又岡田・松原氏著中に見当らないのは、アイイカナゴがシワイカナゴのシノニムとなったためかと思い、そして福浦転じて静浦となったのではないかと考え、最近松原教授にお尋ねした処、私の考え通りであるから訂正せよとの御返事を戴いたから、茲に以上のことを書いて一先づ駿河湾魚類目録から削除する。しかし紀州でとれ、相模湾でとれているのであるから駿河湾に出現の可能性は充分に残されることを附加する。

本篇を草するに当り田中博士・蒲原教授・松原喜代松教授及び阿部宗明博士から得た種々の御援助を記し感謝の意を表する。

Résumé

The author has enumerated four species of fishes with some notes. Among them *Ranzania makua* and *Trulla itina* are newly added to the list of the fishes of Suruga Bay, Japan. *Hypoptychus dybowskii* should be erased from this list.

魚類歯牙の形態学的研究

I. 鯛の歯牙に就いて

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Morophological studies on the teeth of fishes

I. On the teeth of porgies

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魚類の歯牙の研究は、17世紀英人 R. Hooke によつてなされて以来、各分野において色々研究されているが、その組織学的方面の研究は筆者の渉猟せる範囲内では比較的すくないものの様である。筆者は魚類歯牙の組織構造に興味を持ち、我々に比較的身近かな鯛科をえらんで、その研究を行つた。この研究に際し東海区水産研究所農林技官阿部宗明博士の懇篤なる御指導を賜わつた。茲に深く感謝の意を表する。

Ⅰ. 材　　料

日本近海の鯛科に属するものは、マダイ、チダイ、クロダイ、キダイ、ヘダイ、エビスダイ、キビレダイ及びインドダイの8種が数えられるが、入手の関係上下記の5種をえらんだ。

1　*Pagrosomus major* (Temminck et Schlegel)

2　*Evynnis japanicus* Tanaka

3　*Sparus swinhonis* Günther

4　*Taius tumifrons* (Temminck et Schlegel)

5　*Argyrops cardinalis* (Lacépède)

これらの材料はすべて東京都中央卸売市場及び静岡県伊東魚市場に入荷したもので、全長20～60糎のものを用いた。

Ⅱ. 検 査 方 法

この検査の対象としては上顎及び下顎の歯牙に限定し、これについて一方では晒骨を作製して肉眼的観察をし、他方では研磨標本、パラフィン、ツェロイヂン包理による切片標本によつて顕微鏡的観察を行つた。

研磨標本に対しては時に石炭酸フクシン染色を、切片標本に対してはヘマトキシリン・エオヂン重染色、チオニン・ピクリン酸染色、van Gieson 氏染色、銀染色などを施して検鏡した。

Ⅲ. 検 査 所 見

鯛の歯牙は人類の歯牙とかなり趣をことにしている。即ち歯牙は歯冠部と歯根部に分れており、両者は一見無構造のものにより接着せられており、歯根部は顎骨に移行している。

1　肉眼的観察所見

歯牙はその配列の状態により大体外側歯と内側歯に分けられ、歯冠の形態は前方外側の2乃至数

本は特に大型で槍頭状を呈し、内側及び後方外側のものは大型、小型多様であるが、いづれも椀状、小粒状を呈す。外側のものは内側のものに比較して、又前方のものは後方のものに比して、比較的槍頭状を呈す。しかしキダイのみは外側一列が大型の槍頭状で、その他は小粒状で椀状のものは認めない。

歯列は2～数列を数えられるも2～3列が特に明瞭である。歯列中には代償歯の半埋伏及び埋伏の状態のものが認められる事もある。

歯牙の大いさは顎の小型のものに比して大型の顎においては特に大なるものを認む。

色は頂部は帯黄色を、その他の部は淡黄色乃至白色をなしている。しかしこれは絶対的のものではなく、クロダイではむしろ全体的に黒味を帯びている。

2　組織学的観察所見

歯冠部にはエナメル質、象牙質が、歯根部には象牙質がある。両者の間にはヘマトキシリン・エオヂン染色で硝子様にみえる接合部があり、更にこれら硬組織により囲繞せられた中心部に歯髄組織を包含する。組織構造は歯牙の外型によつて左右されない。

(1)　エナメル質

エナメル質は歯冠部象牙質の外側に存在し、脱灰操作により全く消失する。この層の中には管状乃至繊維状の構造物を認め、所謂有管エナメル質の形態を示している。該管状乃至繊維状物は象牙質に接する部では極めて細くエナメル質表層に達する程太くみられる。即ちその末端部は太く象牙質に向うに従つて細くなる。その走行は歯牙の表面では大体並行しているが、エナメル質層の厚径½附近で多くの他のものと交叉し、一見褐色帯状を呈している。更に象牙質の近くでは並行のもの及び各方向に走るものがある。檜山はイシダイのエナメル質を二層に区別しているが、鯛科のこれら5種においては、区別出来る程明瞭な境界は認められない。

(2)　外象牙質

歯冠部象牙質のエナメル質に接する部で象牙細管をもたないもので、一見人類の場合にみられる原成セメント質によく似たものである。このものは次に述べる内象牙質と全く同じ基質を有するもので発生初期においては、大体象牙細管の有無によつて内象牙質と区別される。

外象牙質は歯冠の頂部では極く薄い層として見られるが、接合部の近くではかなりの厚さを示すこの層の厚径の½位迄内象牙質よりの象牙細管が侵入し分枝して終つている。チオニン・ピクリン酸染色によると、厚板構造を示す如く思われ、ヘマトキシリン・エオヂン染色ではやゝエオヂンに好く染る部分として見られるにすぎず、更に銀染色によれば、T. Kvam の論文にあるものと同様に、歯髄に対し放線状に走る繊維状のものがみられる。

(3)　内象牙質

内象牙質は歯髄の上半分を囲み接合部により歯根部と区別せられる真性象牙質である。

1　象牙細管

鯛においても人類の象牙質に見られる様な細管、即ち象牙細管の存在を認める。該象牙細管は歯髄を中心として放射状にエナメル質に向つて走つている。その走行も大体人類のそれと一致し二つの彎曲を有し、S 字状走行の状態をとつている。螺旋状走行については不明である。この細管は走行の途中多くの側枝を出し、側枝は隣在のそれと連絡している。特に象牙質層の中央部より末端にかけて多くの側枝を出す。これらはエナメル質に近接するや2～3に分枝し、多く外象牙質中に終つている。末端は特別な形態を示していない。桐野等はマダイの研磨標本で「細管の末端がピラミッド型になって Tomes の顆粒層として認められる」と報告しているが、筆者はこれを認め得ず、檜山がイシダイにおいていつた「細管末端は相互に連絡しない」という事が鯛科においても云える。

2 象牙繊維象牙繊維は歯髄表層に存在する造象牙細胞の原形質突起で、上記細管中を走り分枝側枝の状態及び太さは象牙細管と一致する。その横断標本においては、細管内壁と象牙繊維との間にはかなり広い空隙が認められ、繊維は分葉状乃至は馬蹄状を示し一方の壁に附着して見える。しかしこの事は、人類の場合標本作製時の結果として現われる事から、同様にして現われたものと考え、正常には空隙はないものと思う。

3 象牙質層板

人類において見られると同様に象牙質には象牙質の層状蓄積と考えられる象牙繊維とほぼ直角の方向に走る層板状のものがみられる。又これら層板の中には B. Orban のいう Owen の外形線ともいうべき特に明瞭なものがヘマトキシリン、エオヂン重染色、及び研磨標本等において、しばしば1～数本の線となつて見られる事がある。

4 幼若象牙質、球間象牙質、Tomes 氏顆粒層

歯髄に接する部の象牙質内面には、石灰化の少くないエオヂンで赤染する狭い一層が区別されるこれは人類のそれと同様幼若象牙質層である。この層の中を象牙細管は通過しており、原成象牙質との境は波濤状を示し、一部には球状灰化と思われる様な凹凸が見られる事もある。この層は未萠出歯にかなり明らかに見られ、半萠出歯、萠出完了後の歯牙程不明瞭になつている。

球間象牙質は一部に球状灰化の傾向と思われる点があるにもかゝわらず全然これを認め得ない。Tomes・顆粒層に相当するものも認められない。

5 エナメル・象牙境

エナメル質と象牙質との境は歯牙の頂部ではやゝジクザク状であるが、接合部に近い方は大体平坦である。外象牙質と内象牙質の境はほゞ平坦である。

6 その他

クロダイ、チダイの2種においては、接合部に近い象牙質には一見 Haver 氏管又は血管と覚しき小孔の存在が認められる。これはかなり多く分布しており、埋伏形成中の歯冠部象牙質中にもみられる事もある。又象牙細管はこのものをさけて、又通過して走つている。この管状物は歯根部象牙質中の骨髄称のものに類似しており、歯冠部より歯根部への移行状態を示しているものかもしれぬ。

（4） 歯根部象牙質

これは Carter J. T. が "Pediment" と記しているもので、人類における象牙質と著しくその構造を異にしているものであつて、むしろ骨及至骨様組織に近い形態を示すものである。しかしこの形成細胞と思われるものが形成期に歯髄腔をかこむ全内面に配列している。そしてこの部の細胞は歯冠部の歯髄の内面に存在する造象牙細胞とその形態において何等区別出来ぬものである。この様に歯冠部象牙質の形成細胞と同一な細胞に由来した組織と考えられるところから、該硬組織をば象牙質の範疇に入れて取扱う事にした。

さて歯根部象牙質はその構造上からこれを2種にわけられる。即ちその一は接合部に近い部及び歯髄内面部に認められるもので、その基質の中には歯冠部の象牙質でみられた様な小孔や骨髄腔と思われる様なものが存在するが、内容物については明確にし得ない。更に象牙細管の走行がみとめられる、しかしこの細管の走行は不規則である。かゝるものを筆者は一応骨様象牙質（Osteoido-dentin）とした。その二は歯根部の下部を占めるもので、他部骨組織と極めて類似した構造を示すもので、前記の骨様象牙質とは細管の有無によつて区別し得られる。これを骨象牙質 Osteodentin）と呼ぶ事にした。骨象牙質は周囲の顎骨と明らかに区別出来る骨質を通して顎骨に移行している。

両者共その内側には幼若象牙質を持たず、又両者共非常に骨組織に似たものである。しかしその中には骨細胞と看做すべきものはない、従つて骨小窩、骨小管といつたものも認められない。

これら両者は明らかな境界を示すものでなくて、象牙細管の消失と共に漸次骨象牙質に移行している。齒牙の萠出初期には骨様象牙質は比較的明瞭であるが時と共に骨象牙質により置換せられる様である。従つて齒冠部の脱落後は骨象牙質が残る。

骨様象牙質はクロダイにおいては明確であるが、他のものはクロダイ程明確ではない。

（5） 接合部

この部は J. T. Carter が“Translucent zone”と呼んだものであり、齒冠部、齒根部の間の部分でエオヂンに淡染し硝子様に見えるもので、銀染色によると上下に走る繊維状のものが認められ、繊維状のものは齒冠部並びに齒根部の象牙質内に入り込んでいる。J. T. Carter によると「この部は齒牙の萠出の直前に作られ後に石灰化する、そして齒冠部の脱落はこの部を境にして行われ、齒冠部の重要な維持装置である」、といつているが、筆者は灰化標本によつて観察したがそこには石灰化は認められず、又それが硬組織であるという根拠は見出されなかつた。他方この部は彼のいう如く維持装置の一つであると筆者も考えるが、このものとは別に更に一つの維持装置と思われるものが観察される。即ち以下に述べるものである。

このものは Studnicvka がいう“Bindegewebsfaserbündel”かどうかは不明であるが、兎も角形態学的には重要な維持装置と考えられるので Studnicvka のいうものに近いものと思われる。このものはヘマトキシリン・エオヂン重染色でエオヂンを多く取り、Van Gieson 氏染色でフクシンに好染するもので、内外象牙質の間及び齒根部象牙質の外側に亘り一層を区別出来る程度に走る又一部は接合部附近でわかれて齒周の結合織に侵入している。チオニン・ピクリン酸染色ではこれは明瞭にみられず、銀染色ではわずかに上下に走る繊維が認められる。しかし一方連続切片による観察においてはこの層は M. Morgenstern のいう“Grenzfaserschicht”に非常によく似ている。特に齒咬頂部のものは M. Morgonstern の論文中の Seekarfen の像のそれと全く区別出来ない。F. Weidenreich の「根棒状の Tomes 氏顆粒層」桐野等の Tmes 氏顆粒層はいづれもこの層を各方向より観察したものにすぎないのではなかろうか？

このものはチダイ、エビスダイ、に特に著明である。齒冠部ではこの層を象牙細管が通過している。

以上の事から筆者は M. Morgonstern の“Grenzfaserschecht”も Studnicvka の“Bindewebsfaserbündel”も同一のものと考え、これを“Grenzfaserschicht”と呼んでおく。

（6） 齒　髄

多くの研究者により“Denfinal Pulp”とか“Dentinal Papilla”とか記されているもので、前述の各硬組織により囲まれた軟組織である。その表面全体に造象牙細胞を有し、その内方は結合織細胞を主体とする組織である。

1　造象牙細胞

人類のそれと同様に齒牙の内面を被つている長楕円形乃至長方形の細胞で1～数列に配列し側方及び齒髄へ突起を出しそれぞれ隣在の同細胞及び齒髄細胞と結合している。一方象牙質へも象牙細管を通じ突起を出し象牙繊維を形成しているが、齒根部の骨象牙質の内側に存在する同種の細胞はこの種の突起を出すかどうかは不明である。

核は核質に富みヘマトキシリンで濃染する、核の位置は細胞の内方に偏して存在する。型は長楕円形乃至楕円形で一つの細胞に一個宛存在する。

齒根部の内特に末端に近い造象牙細胞はその配列がやゝ乱れており、更に数列となり齒髄組織に移行する様な像が見られる。

2　齒髄組織

細胞は主として繊維芽細胞及び繊維細胞、即ち齒髄細胞よりなり、その基質については明確にし

得ない。歯髄細胞はそれぞれ隣在のものと結合し網眼を構成している。一般に歯牙の形成期のものは形成後のものより繊維化が弱い、従つて歯冠部のものは歯根部のものより繊維化傾向が強く現われている。

歯髄細胞は他部の結合織のそれと同じく紡垂形、三角形をなし、核は楕円形乃至類楕円形のもの一個を有している。繊維は Van Gieson 染色、銀染色で見ると大部分 T. Kvam 等がいつている様に膠原性繊維である。又人類にみられる様な細胞稀薄層や細胞稠密層は見る事が出来ない。

血管は比較的多量にみられ、特に歯根部に多くみられる。

その他歯髄組織にみられる細胞として H. Stross は Rundzellen, Leukozytöse Zelle, Bindegewebe Zelle を挙げているが、筆者は円形の細胞及び血球と思われているものを認めた。それ以外のものについては全く不明である。円形の細胞は割合に多く原形質は少くて核もほぼ円形を示し、ヘマトキシリンで濃染する。

神経及び淋巴の検索は出来なかつた。

Ⅳ. 総括及び考察

鯛科の歯牙は上記の如く構成されているが、その形成から脱落に至るまでにその形態において多少異なる点がある。これは魚類が多生歯類であるため、人類の如く永久歯による長期間の生理作用という様なものの要求がない。従つて一定の形を保つている事よりも、生長しては脱落し、脱落しては新たに萠出するという様に常に動的な状態に置かれている為と思う。歯牙の構造を検べる場合どの時期のものを中心に述べたらよいか問題となつてくる。そこで筆者は次の如く期に分けて考えることにした。

（1） 形成期

この時期は未だエナメル器が存在し、歯冠部の形成期であり、歯根部は形成されていない。この時期の状態は象牙細管も太く、幼若象牙質層も明瞭で、歯髄は半円状であり非常に細胞成分殊に繊維芽細胞に富んでいる状態である。

（2） 完成期

萠出直前乃至萠出直後のもので最も基本的のものと考えられる状態のものである。この時期は歯冠部、歯根部及び接合部の形成が一応完了した時期で、歯髄腔は大きく歯髄の細胞成分も歯冠部は歯根部に比して繊維化傾向が大となり、繊維細胞の量もかなり多くなつている。歯根部は骨様象牙質も明瞭で歯根部全体の厚径は割合薄くみられ、歯髄の全表面には造象牙細胞の排列が認められる。

（3） 脱落期

この時期になると、象牙質は更に発育する為歯髄腔の狭窄がみられ、内面は凹凸が現われてくる幼若象牙質も不明瞭となり、歯髄も細胞成分が非常に減少し繊維成分が大部分を占める。造象牙質細胞も歯冠部象牙質の内面のみにしか見られなくなり、骨象牙質は増殖し骨様象牙質を置換する様になつてくる。歯根部の歯髄腔の狭窄もみられ、歯根部の厚さもかなり厚くなる。歯牙が脱落した後は骨象牙質によりその部分は補充せられ、更に顎骨と区別出来なくなる。

以上の事から筆者は鯛科の歯牙の基本型のものとしては、完成期の状態があてはまると思う。そして基本型を中心として形成期、脱落期が明瞭な境を示さず連続していると考える。

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Résumé

1. Materials and Methods.

Materials are the teeth of upper and lower jaws of five kinds of the porgies which are common in Japanese waters. They are *Pagrosomus major* (Temminck *et* Schlegel), *Evynnis japonicus* Tanaka, *Sparus swinhonis* Günther, *Taius tumifrons* Temminck *et* Schlegel) and *Argyrops cardinalis* (Laépède . All of them are 20-60 cm in length.

Methods used were: microscopic observation of the bleached-bone, and microscopic observation of ground, paraffin and celloidin sections.

2. Findings.

The teeth consist of crown and root areas; they are joined by a contact area; and they are together surrounding the pulp tissue. The root area spreads to jaw-bones.

a) The teeth are divided into outside and inside teeth by their arrangement. Two or several of the anterior-outside teeth are especially large and spear-form; inside and post rior-outside teeth are of various size and bowl-or, grain-form. However, only *Taius tumifrons* does not show the bowl-form. Color is yellowish-white or light yellow, but *Sparus swinhonis* shows a tinge of black.

b) The crown area consists of enamel and dentin (inside dentin, outside dentin); and the root area consists of dentin.

The enamel is the so-called "tubular enamel" in which the tubules of fibrous structure cross each other in middle layer of enamel, and it may be seen as a brown

zone.

The outside dentin is placed between enamel and inside dentin, seems to be a primary cement; and dentinal tubules have branches and end in the middle layer of the outside dentine.

The inside dentin has dentinal tubules similar to human dentin, and these tubules are running with S-shaped curves. In this layer are found the dentinal lamellae, Owen's contour lines and praedentin, but the writer has never seen interglobular dentin and TOMES' granular layer.

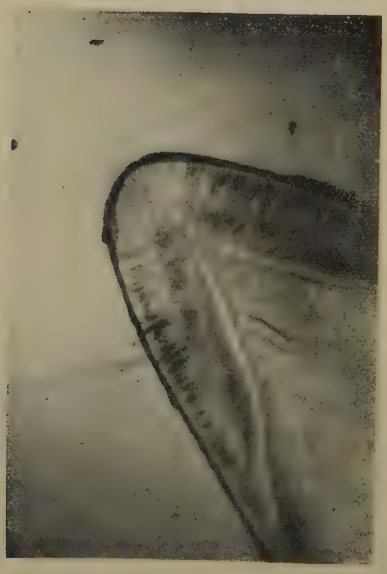
In the dentin of root area is found a osteoid-dentin that has dentinal tubules near the crown area and osteodentin which has no dentinal tubules and is under the osteoid-dentin.

c) The pulp tissue chiefly consists of fibroblasts and fibrocytes. There are odontoblast layer in the surface of pulp tissue, and the pulp tends to be fibrous. The dentinal fibers are long, slender protoplasmic processes projecting from the cell into a dentinal tubule and running through the tubule to the outer surface of the dentin.

d) The contact area is fibrous, not calcified, and seems to be a retentive apparatus of the crown area.

e) Moreover, there is a fibrous layer which seems to be a "Grenzfasershicht" as stated by M. MORGENSTERN.

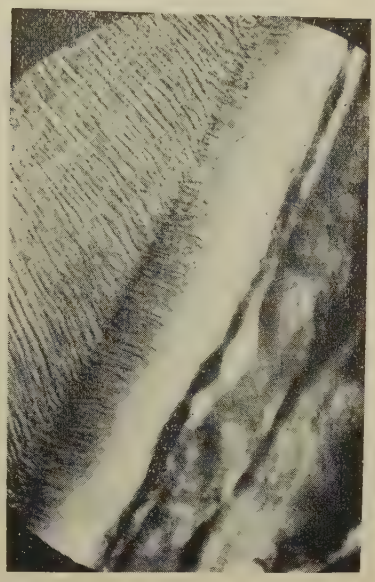
第 1 図



第 2 図

第　3　図

第　4　図



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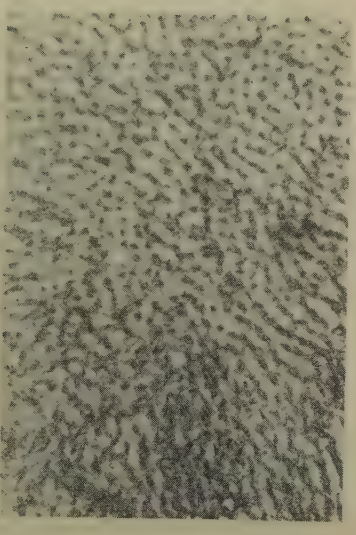
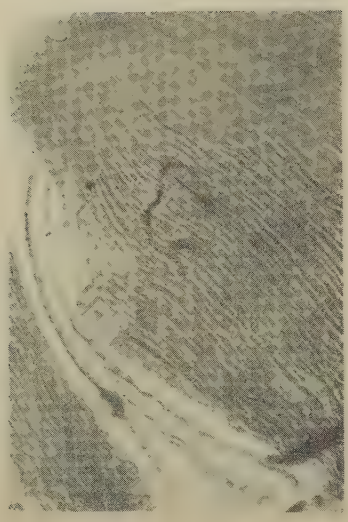


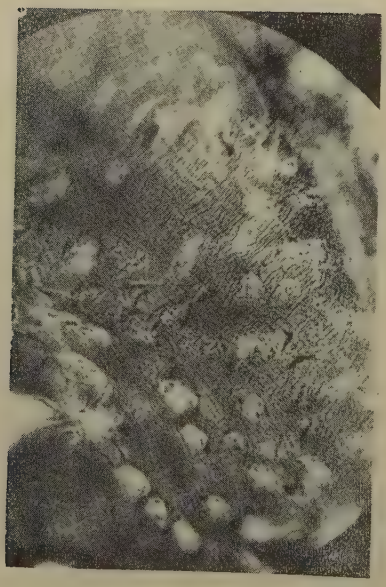
第　6　図

第 7 図

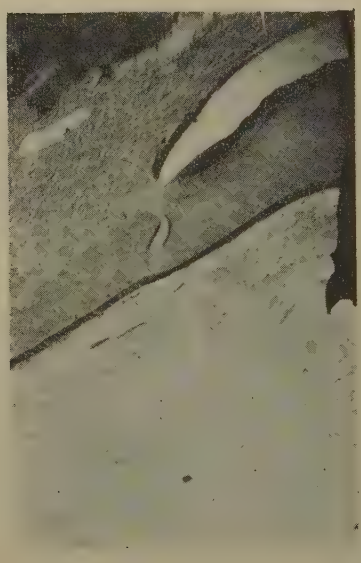


第 8 図

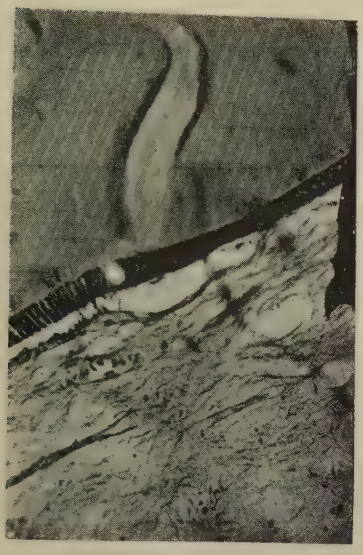
第 9 図



第 10 図



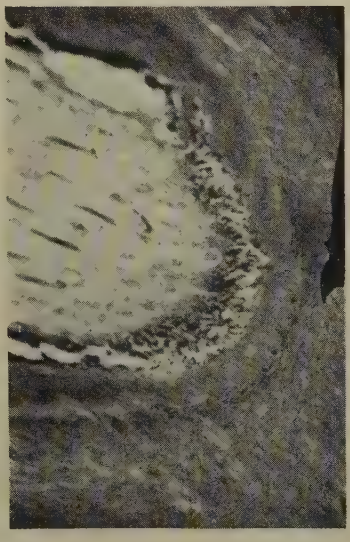
第　11　図



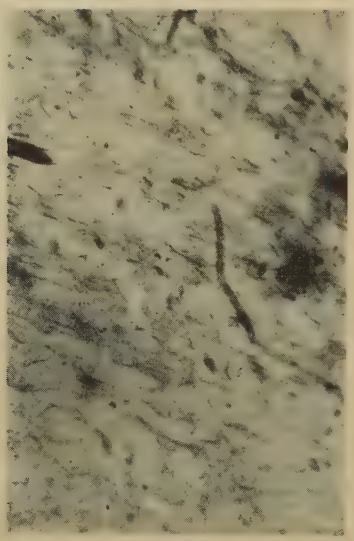
第　12　図

第　13　図

第　14　図



第　15　図



第　16　図

Ⅶ. 寫　眞　說　明

第1図　キダイの研磨標本に於けるエナメル質の管状乃至線維状構造物，内部に向うに従い彎曲している。8×10

第2図　鍍銀法によるクロダイの外象牙質及び Grenzfaserschicht，線維状の構造がみられる。8×40

第3図　クロダイの研磨標本に見られた象牙質層板，中に特に明瞭な2数本がある。

第4図　マダイの接合部附近の内外象牙質境界部，象牙細管の分枝の状態及び末端の状態がみられるが，Tomes 氏顆粒層は見られない。8×40

第5図　マダイ象牙細管の横断，細管の中に象牙線維を認める。8×100

第6図　クロダイ歯胚に於ける著明なる幼若象牙質層。8×10

第7図　クロダイ接合部附近の内象牙質中にみられた不明なる管状構造物，内容物の確認は出来ず，象牙細管は迂過したり又さけて走つたりしているが，此の図では通過している。8×40

第8図　クロダイの骨様象牙質，象牙細管の不規則なしかも粗な走行がみられる。8×40

第9図　第8図の骨様象牙質と骨象牙質の境界，象牙細管が次第に消失していく，一面に骨髄様の管腔がみられる。8×40

第10—11図　クロダイの接合部附近の歯髄（8×10），（8×40），図の右方が歯冠部で中央彎曲帯状の接合部がみられる，造象牙細胞は歯冠部のものも歯根部のものも区別が出来ない。

第12図　鍍銀法によるキダイの接合部，上下に走る線維状のものが見られ一部は象牙質に入り込んでいる。8×40

第13図　歯冠部の切線状切断によつて現われたチダイの Grenzfaserschicht．8×10

第14図　完成直後と思われるクロダイの歯根部。造象牙細胞は不規則にしかも幾層にも並んでいる。8×10

第15—16図　歯髄の部位による細胞成分の粗密を示す，15図は歯冠部のもので16図の歯根部附近のものよりかなり線維化し細胞も少くない。8×40

Studies on the Deep-Water Fishes from off Hokkaido and Adjacent Regions

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While examining many specimens of fishes from the depth off the coasts of Hokkaido and its adjacent regions, the author has found some interesting species which have hitherto been little known or unrecorded from the waters of Hokkaido and northern Japan, as well as some others which require criticism from the ichthyological point of view. Here the author wishes to report his observations and gives some ichthyological annotations on them in following series of this study. The materials for this study were chiefly obtained from the catches brought up by the bottom-twawl or "Kisen-sokobiki" from a depth about 150 to 1200 m, at the fishing grounds and landed on the harbors at Kushiro, Abashiri, Mombetsu of Kitami Prov., Wakkanai, Otaru, Muroran and Hakodate, etc. The majority of the materials were collected by the author himself from the spring of 1949 to the winter of 1952 at fish-markets, but some others were given to the author by the branches of the Hokkaido Fishery Experimental Station situated at the cities stated above. The specimens thus collected amount to over one thousand in number and contain about 190 species belonging to 130 genera and 41 families as far as the author has studied to this day.

In addition to the above mentioned materials, the specimens of several interesting species collected by Mr. T. Hikita at various places in Hokkaido in many years were placed in the author's hand for a closer examinations, and also some imperfectly known fishes were given to him by Mr. H. Misu who spared them from his collections made in the depth of the northern Japan Sea by the aid of a bottom-trawel net of the training vessel "Hokusei-maru" attached to the Faculty of Fisheries, Hokkaido University, from May to October in 1951.

In August 1952, Hikita and Misu published their report on the deep-water fishes based upon the above stated Misu's collections.[1)]

But they have committed some obvious mistakes in their identification of species. For instance, *Myoxocephalus tuberculatus* Soldatov & Pavlenko in their report (p. 35, pl. VI. fig. 4) is nothing but *M. ochotensis* of Schmidt.[2)] and *Cyclolumpus asperrimus* Tanaka (p. 40, pl. VIII. fig. 1) is a species of the genus *Cyclolumpus birulai* (Popov) as one can understand from their description and figure. So their report is in need of revision, and the author will freely give his opinion on the subject concerned in the present article.

In the following description of various parts of body in each species, the measurement is done as below:

The body length is measured from the tip of snout to the base of caudal fin; the length of head, from the tip of snout to the extreme posterior margin of

opercular flap; the depth of body is indicated by the vertical breadth of the deepest part of body; the length of snout is represented by the length between the tip of snout and the extreme anterior margin of orbit; the length of maxillary is measured from the tip of upper lip to the posterior end of maxillary; the diamater of orbit is the horizontal distance between the opposite margins; the width of interorbital space is meant by the distance between the upper margins of eyes; the length of caudal peduncle is shown by the length between the base of hindmost anal ray to the base of caudal fin; the depth of the same is the least vertical width of caudal peduncle; the length of each fin is represented by the length of its own longest ray.

The author wishes to express here his sincere gratitude to his teacher Mr. T. Hikita and Prof. S. Saito, for their kind guidance and valuable advices throughout the course of this work. He also wishes to thank Prof. J. Tokida for his correction of original manuscript. Further his thanks are due to Prof. S. Sato who has given him various advices as well as permission to use his library freely; and to the staff members of the Kushiro, Otaru, Mombetsu, Muroran and Hakodate branches of the Hokkaido Fishery Experimental Station, for various facilities they gave him for the sampling and observation of materials, and finally to Mr. H. Misu, who spared many valuable specimens from his collections to the author.

I. On a rare fish, *Zaprora silenus* Jordan, found off Kushiro, Hokkaido

In 1943, Dr. K. Kuronuma recorded a specimen of this fish taken from a spot off Paramushiru Island, Kuril's, with a brief description under the new Japanese name "Bōzu-ginpo". But it has been unrecorded, hitherto, from the sea of Hokkaido. However, the author obtained a single specimen, 130 mm long, from the fish-market of Kushiro in 23, December, 1951.

Zaprora silenus Jordan

Zaprora silenus Jordan, 1896, Proc. Calif. Acad. Sci., p. 203, pl. 20, (Nanaimo, Vancouver).····· Jordan & Evermann, 1898, Bull. U. S. Nat. Mus., (47), Pt. 3, p. 2850, fig. 409, (British Columbia).····· Evermann & Goldsborough, 1907, Bull. Bur. Fish., 26, p. 276, fig. 25, (Unalaska).····· Schultz, 1934, Copeia, 3. p. 98.: 1936 Publ. Washington Univ. Biol., 2, (4), p. 128, 191.····· Taranetz, 1937, Bull. Paci. Sci. Inst. Fish. Ocea., 11, p. 151,····· Chapmann & Townsend, 1938, Ann. Mag. Nat. Hist., 11, (2), p. 89,····· Kuronuma, 1943, Bull. Biogeograph. Soci. Japan., 13, (16), p. 112, (Paramushiru, Kurils).····· Clemens & Wilby, 1949, Bull. Fish. Resea. Boar. Canada, (68), p. 199, fig. 136, (British Columbia).

D. 53; A. 28 P. 24; B. 5; Gill-rakers 25 on the first gillarch. Head 4.52 in body length; depth 2.95. Snout 3.90 in head; width of head 2.10; maxillary 2.80; orbit 4.90; length of caudal peduncle 4.21; depth of the same 1.97; interorbital space 2.67;

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1). Report on the ichthyofauna from the depth of the northern Japan Sea. 1952. (in Japanese)

2). Schmidt, 1929, Ann. Mus. Zool. Acad. Sci. l' URSS. p. 417, fig. 3,; he described and figured as a new subspecies under the name of *Myoxocephalus verrucosus ochotensis* based upon several young fishes from Ochotsk Sea, but Taranetz, in 1937, treated as a independent species with adult specimens for difference from original description of *M. verrucosus* by Bean from Bering Sea.

postorbital part of head 1.73; longest dorsal 2.03; same of anal 1.63; pectoral fin length 1.48; caudal fin length 1.40.

Body robust, greatly compressed back not elevated, caudal peduncle high. Body and head covered with small adherent cycloid scales except distal third of all fins, gill-membrance, lips, cheeks, snout, opercles and bones about orbit. Head short, nape not elevated, gently sloped in the upper profil. Eye modera', placed inhigh. Mouth terminal, slightly oblique; the upper jaw protractile, but not movable; the lower jaw very heavy, its tip projecting beyond the upper jaw. Teeth small, but rather strong, close-set, formes a uniform cutting edge; vomer, palatine and tongue toothless. The lower pharyngeals narrow, with many bluntish small teeth; the upper ones rather large, with the similar teeth on its top. Pseudobranchiaes present. Gill-rakers very slender and flexible, 8 on upper and 17 on lower lobe; gills four, with a large slit behind the last gill-arch; gill-membranes united together, but entirely free from isthmus. Preopercle, parietal region, lower jaw and regions about orbit with many distinct fixing mucous pores; three of them on each rim of lower jaw; behind these three ones arranged in a line on horizontal limb of preopercles; three onvertical limbs of the same; two in front of eye; one at near nostrils; another one above eye; seven on suborbital regions; four arranged in two rows behind eye; a horizontal row of four pores along the temporal regions, the last one on the opercle flap just above gill-opening; one at vertex; another one midway between vertex and eye; and two on each side of nape. Lateral line obsolete. Pectoral fin large, rounded and placed in moderately high. Dorsal fin low, beginning above the preopercle rimb, composed of simple inarticulate rays; the rays flexible and about equal length. Anal fin inserted under the 26th dorsal ray, the longest one longer than that of dorsal; all rays branched and subequal length. Ventral fin absents. Caudal fin rounded at the posterior margin; caudal peduncle short and stout, not cylindalical. Vent closed to the front of anal fin.

Color in formalin, dusky brown uniformly; no marking on body on body and head; belly pale.

The present specimen somewhat differs from the original description of JORDAN (1866, p. 203), in following points:

JORDAN's holotype	Present specimen
1). Head 5 $^{2}/_{5}$ (5.40) in body length.	1). Head about 4.50 in body length.
2). Depth 4 $^{1}/_{8}$ (4.15) in body length.	2). Depth about 3.00 in body length.
3). Dorsal 56.	3). Dorsal 53.
4). Pectoral 20 to 22.	4). Pectoral 24.
5). Eye 5 $^{1}/_{3}$ (about 5.30) in head.	5). Eye 4.90 in head.
6). Snout 5 $^{1}/_{3}$ in head.	6). Snout about 4.0 in head.
7). Gill-rakers 28 on the first arch.	7). Gill-rakers 25 on the first arch.

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(To be concluded)

Comparative Studies of the Scales in Japanese Freshwater Fishes, with Special Reference to Phylogeny and Evolution

(*continued from vol: ii, p. 260*)

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[IV] Particular Lepidology of Freshwater Fishes

I Suborder Isospondyli

Japanese Isospondyli has 20 families, 5 of which are related with freshwater. They are (1) Engraulidae, (2) Salmonidae, (3) Plecoglossidae and (4) Osmeridae, and besides these (5) Drosomateidae which sometimes comes into freshwater, and also the exotic families related to them, Coregonidae and Thymallidae, were used as materials for comparative study. Consequently as to 7 families in all, the phylogenetic relation as well as the difference of scale character were considered. All the other families being true marine fishes, relation between both will be studied in future.

〔1〕 Engraulidae

Fishes belonging to this family are originally marine, but among them, some members of the genus *Coilia* often goes up a river and is admitted as a member of freshwater fishes. The fishes belonging to this family are all possessors of cycloid scales. Besides Japanese *Coilia mystus* and Corean *C. ectenes*, *Engraulis japonica*, a typical fish of this family; *Clupea*, *Sardinia* and *Harengula* in Clupeidae; and *Clupanodon punctatus* in Dorosomateidae were observed at the same time as comparative materials.

The scale character of the two species belonging to Genus *Coilia* is much the same and so similar as to be hardly distinguishable. In both, apical grooves form network, apical area having no ridges. Ridges, which are in basal and lateral areas, are very delicate, suddenly disappearing near boundary of apical area. A few basal grooves, starting from basal margin, run longitudinally — not being radial — and go backward, nothing that may be called true lateral grooves being observable. They are apical grooves extended forward or basal grooves extended backward, all of which are connected with network of apical grooves, except a few which disappear halfway.

As to ridges, right and left ones break once on longitudinal line, or both are connected making an obtuse angle, or sometimes one groove lies where this longitudinal line runs, dividing ridges into right and left ones. In short, ridges are not regularly circular, which fact is an important characteristic of scales of Engrauridae.

In the apical area, growth lines can be seen, and in basal area, annual zones or what may be called spawning marks.

Scales of *Coilia* are completely different from those of other Japanese freshwater fishes, and there is nothing else to be compared with them.

Discussion

The peculiar arrangement of basal ridges is also seen in *Clupea pallasii* of Clupeidae, telling the close affinity between *Coilia* and *Clupea*. When seen only from this character, *Clupea* resembles *Coilia* more than *Sardinia* and *Harengula* in Clupeidae.

Engraulis japonicus has two kinds of ridges, each of which is different in structure, having the same basal ridges as those of *Sardinia*, and apical ridges in ordinary scales consist of many ridges running almost transverse and not connected; these apical ridges, however, occasionally coil into many finger-pattern-like ridges groups (Fig. 12). Such a structure is seldom seen in fishes of any other family, but also seen in *Coilia nasus*, though not so finger-pattern-like, and they sometimes run irregularly, showing a tendency to resemble those of *Engraulis*. This proves the close affinity between *Engraulis* and *Coilia*.

Harengula zunasi in Clupeidae has two kinds of grooves, of which apical grooves are radial and indistinct, while basal grooves, the principal characteristic of this species, are not circular at all. This is exactly what the author (1950 pointed out showing the terms, radii and circuli to be inappropriate. Yet also in *Coilia*, ridges show a tendency to run more or less transverse. They differ from those of Salmonidae and Cyprinidae in being spread out to right and left as they run; and in this point it closely resembles *Sardinia* in Clupeidae. Grooves are not radial either, especially basal grooves running longitudinally. That grooves form an anastomosing network is more or less observable like dawn both in *Engraulis japonicus* of this family and in *Sardinia melanosticta* in Clupeidae, though not so distinctly as in *Coilia*.

After all, having the scale character proper to Engraulidae and the most peculiar structure in this family, *Coilia* is considered to be an isolated genus in Engraulidae. The character of ridges resembles that of *Clupea* in Clupeidae, and is also close to that of *Sardinia*; and it resembles *Engraulis* in that it makes irregular ridges, and when seen from the condition of grooves, is supposed to be related to *Sardinia* and *Engraulis*, and to be very distant in affinity from *Harengula* in Clupeidae. Again, scales of *Coilia* are so easy to peel off, that they are lost in many specimens; it is similar in this point to *Engraulis* and *Clupea*, but differs much from *Harengula* and *Clupanodon*.

Genus *Coilia*

The two species belonging to *Coilia* are admitted to be almost systematically perfect independent species, which is understood also in scale character. In the scale character of both, however, exists no fundamental difference, and there is no ground to make them different genera. It is recognized in scale character that these two species are closer in affinity to each other than to any other species. Scales on the right middle line of the belly make 'scutes'. According to JORDAN & HUBBS (1925), and IKEDA (1937), the Continental *Coilia* and that of the River Tikugo are of the same species, being regarded as *Coilia ectenes*, but the author supports YOSIDA's view

(1935) which regards them as independent species.

(1) *Coilia mystus* (Linnaeus) (Fig. 13)

Scales of c. b. s. and s. c. p. were torn off leaving nothing and could not be had by any means. Those collected from the part right above posterior 1/3 of the anal fin were observed.

Outline of scales are subsphaerical; middle part of basal margin is roundly swelled out; apical tip is somewhat sharply pointed; hardly any angle is observable; focus is situated in center of scales.

Apical area is filled all over with anastomosing network grooves, whose meshes are larger in center, becoming smaller before and behind it, and smaller still near apical margin. They are various in form and size, quadrangular to hexagonal shaped, with no angles near margin, ending freely and disappearing before they reach margin. Near boundary of lateral area, network is densely broken, some of which stretches forward into lateral area and then disappear, and the rest stretches still more forward into basal area, until it reach basal margin. Some of basal and lateral grooves are often branched. These lateral grooves, having no relation with lateral margin, cannot be called true lateral grooves, but they are only extension of apical and basel grooves, or what are extended forward from focal area. These basal and leteral grooves are hardly radial, several of which stretch forward from focus and tend to run longitudinally coming together on way into a single line.

In the fish from the river Tikugo, 28 cm, number of grooves reaching basal margin was 1 (sometimes 0) in c. b. s. scales, 10 (5–14) in scales in the part right above anal fin.

Scales have basal and lateral ridges, with no apical ridges at all. Ridges are all very delicate and dense, not regularly circular, but somewhat spreading out to right and left, and suddenly disappearing where it enters apical area. As to basal ridges, some are cut in middle, some connected, and some connected here making obtuse angles. Ridge space is almost same everywhere, winter zone being unseen.

No growth lines were seen.

The phylogenetical description having been written in detail in the passage of the family already, it will not be repeated here.

(2) *Coilia ectenes* Temminck et Schlegel (Fig. 14)

Specimen from Seoul, Corea, body length 24.5 cm.

Scales closely resemble those of *Mystus* (Generic name is omitted, and so is it in the following), being hardly distinguishable, but meshes of apical grooves are rather irregular in form and size, large and small, and various ones mixing together, and those elongated before and behind being observed in plenty; and sometimes network intrudes into lateral area, or it is not formed in a part of apical area.

Number of basal grooves is very small; extended apical grooves and those starting from focus, are connected on the way into a single line reaching basal margin, or disappear halfway before reaching it; those grooves which start from apical network grooves and extend to lateral area ending there freely, are hardly to

be seen.

In apical area, growth lines are seen, and in basal area, such a structure as winter zones or spawning marks; i. e., in this zone, ridges disappear making annual rings like those seen in *Pagrosomus*, but on entering lateral area, they suddenly become indistinct disappearing at last. It is observed in scales of this species that those ridges in front of focus run irregularly and tend to make a finger-pattern-like structure seen in *Engraulis*, which is a peculiar characteristic of Genus *Coilia*.

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(to be concluded)

メダカの臀鰭軟條数の変異に関する研究

I. 日本各地産野生メダカの軟條数の変異（続き）

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Studies on the variation of the number of the anal fin-rays in *Oryzias latipes*.

I. Geographical variataon in wild populations (*continned from p. 35*)

Nobuo Egami

(Zool. Inst., Fac. Sci., Tokyo Univ.)

Résumé

The regional variations of number of the anal fin-rays were examined of 4437 wild specimens of *Oryzias latipes* collected at 56 different localitis in Japan. The results obtained are given in table 1, as "frequency distribution curve," in fig. 1. Fig. 2 is a map showing the mean value of the fin ray counts of the fish caught at the respective locality. From the results, the following may be concluded:

(1) Within the neighbouring localities belonging to the same watershed, the averages of the number of the rays do not show a significant difference.

(2) The differences are often significant among the fish living in the waters situated at the isolated regions.

(3) The number of the rays does not show a decrease or an increase according to the differences of the circumstances (temperature, for instance) at the locality.

(4) The geographical variation is caused not by the agents of environment, but chiefly by the differences of the gene-constitutions.

Fig. 1 Variations of the number of the anal fin-rays
—— wild specimens in the respective locality
..... mutant strains cultured in our laboratory

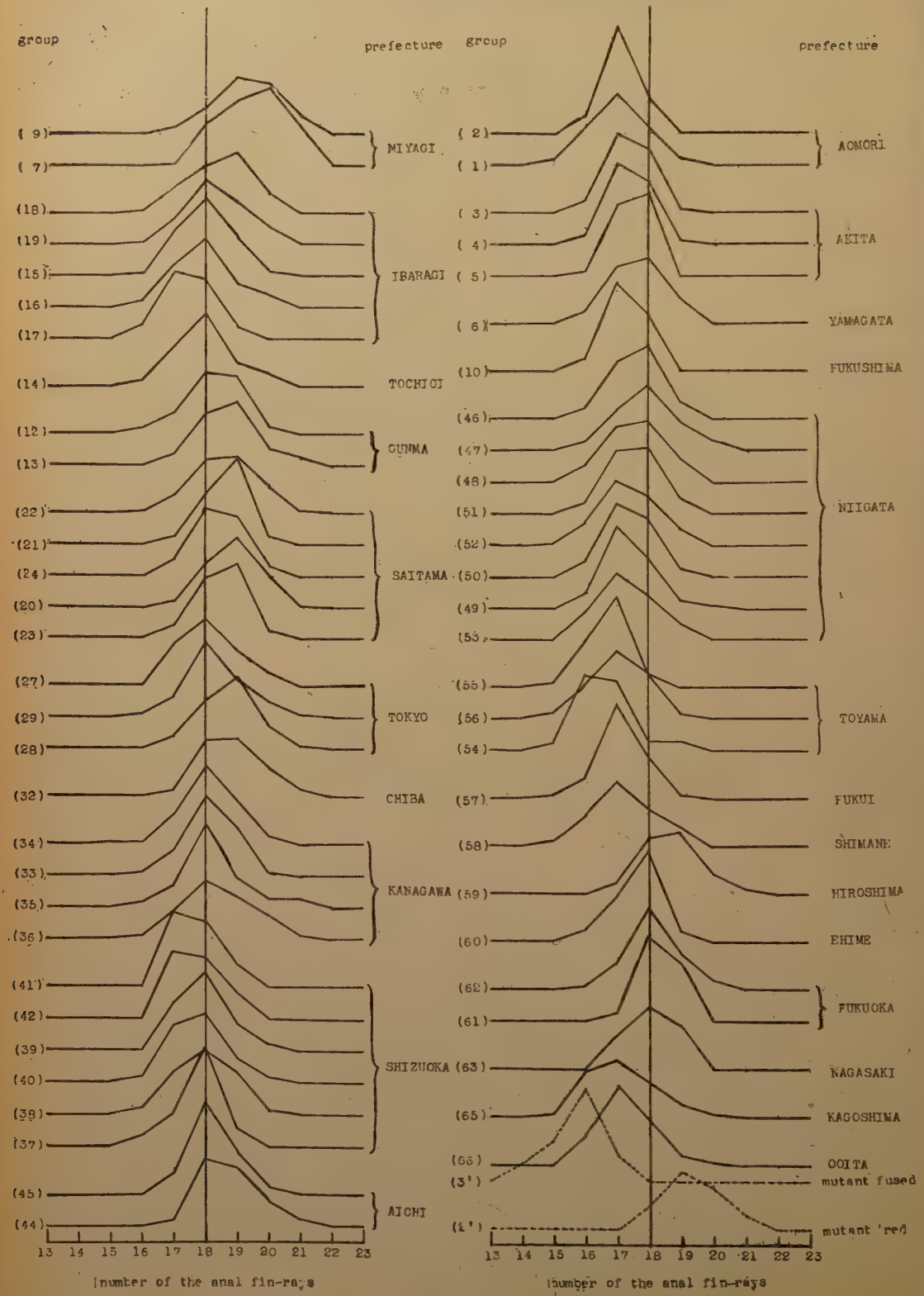
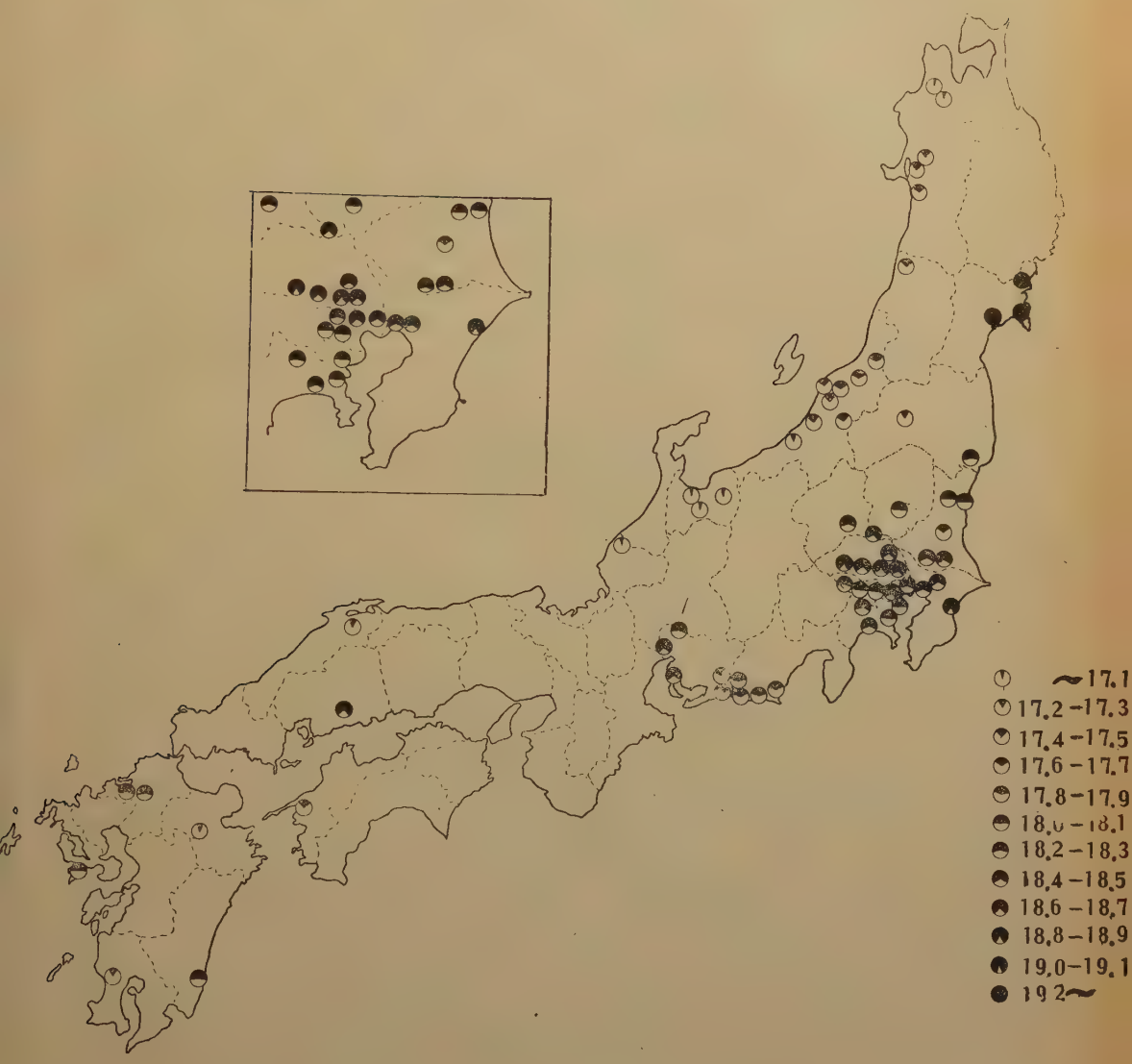


Fig 2. Map showing the localities in the text. Signs show the average number of the fin-rays in the fish population at the respectire locality.



New, Rare or Uncommon Fishes from Japanese Waters. IV. Records of Rare Fishes of the Families *Lophotidae*, *Nomeidae* and *Icosteidae*

Tokiharu ABE

Tokaiku Suisan Kenkyujo, and Zool. Inst., Fac. Sci., Tokyo Univ.

A. *Eumecichthys fiski* (GÜNTHER) "Tengu-no-tachi"

In February, 1939, an example of 881 mm total length of this species was caught by the staff members of the Kōchi Prefectural Fisheries Experimental Station off Kōchi Prefecture, and this was reported upon by Dr. MATSUBARA (1939). Around October-November, 1937, several examples of this fish were caught by a certain kind of net near Hagi, Yamaguchi Prefecture (southern part of Japan Sea , from which Mr. Ichirō TANAKA collected three specimens. Of these three, one was deposited in his own private museum, one was presented to Koshigahama Primary School, Hagi, and the third specimen was sent to Dr. Shigeho TANAKA. The first specimen just mentioned, 917 mm in total length, was examined and reported upon by Dr. KAMOHARA (1942). Recently the present writer has found a specimen of this fish at the Zoological Institute, Faculty of Science, Tokyo University, which was received by Dr. TANAKA from Yamakoshi Co. The exact data of the specimen are lacking, b t it was undoubtedly collected from Japanese waters. The company primarily handled models for medical schools, and occasionally collected and sent rare fishes to Dr. TANAKA.

The specimen sent by Yamakoshi Co. (Cat. No. 47824, Zool. Inst., Fac. Sci., Tokyo Univ.) (fig. 1) measures 752 mm in total length (from the tip of the snout to the tip of the caudal fin) and 728 mm in standard length. The following measurements are given in hundredths of the standard length: Length of head 10.8, length of head measured from the anterior end of the upper jaw to the posterior end of the opercle (=length of head without rostral projection) 6.0, greatest depth of body (at the point a little in advance of posterior end of opercular flap) 3.1, depth of body at middle of body 2.5, depth of body at vent 1.3, depth of body at base of caudal fin 0.7, greatest breadth of body (at posterior margin of eye) 1.3, breadth of body at middle of body 0.7, distance between anterior end of rostral projection and vent 97.1, length of snout (with rostral projection) 6.0, length of snout (exclusive of rostral projection) 1.2, diameter of orbit 1.3, length of upper jaw 1.5, interorbital breadth (above centers of orbits) 1.0, length of 2nd dorsal fin-ray* 6.6, length of dorsal fin-ray above middle of body 3.4, length of longest anal fin-ray 0.2, length of longest caudal fin-ray 3.3, length of longest pectoral fin-ray 1.9.

D. 310; A. *ca.* 5 (each half of anterior fin-rays seems to be slightly apart from its partner); P. 14 on each side (uppermost fin-ray very short); C. *ca.* 13 (probably all the fin-rays unranched; lowermost fin-ray thick and strong).

* The first dorsal fin-ray seems to have been demaged at its tip. The remaining proximal part is strong.

Pseudobranchiae well developed. Branchiostegals 6 on each side; left or right branchiostegal membrane proximally not covering its partner. Gill-rakers 4/1/6 on each side.

The present specimen mostly agrees with the description given by Dr. MATSUBARA of a specimen from off Kōchi Prefecture. In the present specimen the caudal fin is not notched behind, although the membrane between the lowermost long fin-rays of the caudal is much wider than those placed above it. The membranes of the caudal fin are much thicker than those of the other fins. The back is dark brown, crossed by 24 darker vertical bands which lower down to points a little lower than the midway between the dorsal edge of the trunk and the lateral line. Each premaxillary is covered with a band of minute fleshy tubercles, which is bordered externally and laterally by a single row of small conical teeth (covered by membrane, 7 in number) and which is bordered anteriorly by a batch of irregularly arranged, widely separated, much larger curved teeth (6 or 7 in number). Each dentary bears two rather irregular rows of widely separated curved teeth which are basally covered by a membrane.

Fig. 1. *Eumecichthys fiski* (GÜNTHER) from Japan. Cat. No. 47824, Zool. Inst. Total length 752 mm.

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B. *Papyrichthys ischanus* (JORDAN and THOMPSON) "Kon-nyaku-aji". Fig. 2

An example of this rare species was collected by Mr. Chikashi NAKAMURA, Kesen-numa, and sent for study to the present writer. It was taken off Ōya-mura (south of Kesen-numa) on June 20, 1952, by a trap net. The total length of the specimen is 191 mm, and the standard length is 156 mm. The following measurements are given in hundredths of the standard length: Greatest depth of body (at base of lst anal fin-ray) 35.9, greatest breadth of body (at middle point of appressed pectoral fin) 14.1, breadth of body just behind abdominal cavity 8.3, least depth of caudal peduncle 7.1, length of head 28.2, diameter of orbit 6.1, interorbital breadth (above centers of orbits) 9.6, length of snout 9.6, length of highest dorsal fin-ray *ca.* 13.5, length of highest anal fin-ray *ca.* 14.1, length of longest pectoral fin-ray 16.7, length of longest ventral fin-ray 19.2, length of longest caudal fin-ray 23.7.

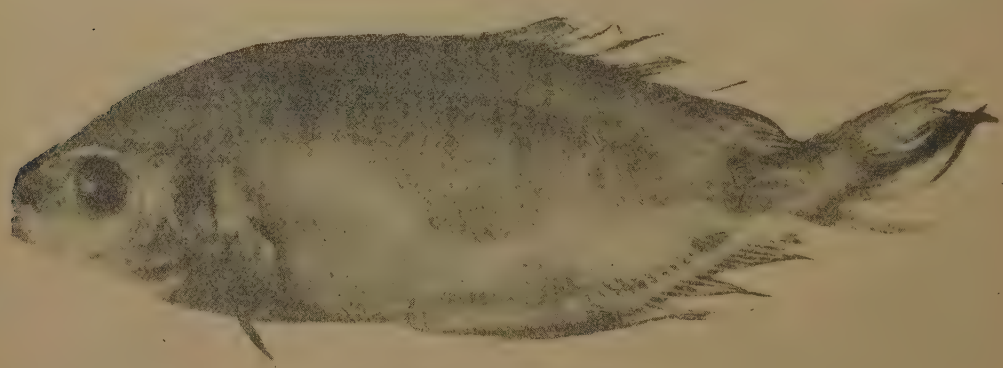

Fig. 2. *Papyrichthys ischanus* (JORDAN and THOMPSON) from off Ōya-mura, northern Japan. Total length 191 mm.

D. XI, 32; A. II or III, 31; P. 19 (left) and 18 (right); V. I, 5 on both sides; C. *ca.* ix/8/7/*ca.* x; total number of vertebrae (examined by X-rays) 41 or 40.

Pseudobranchiae well developed. Gills 4; a slit behind 4th gill-arch. Branchiostegals 6 on both sides; left or right branchiostegal membrane proximally not covering its

partner. Gill-rakers 9/1/15 on both sides. Series of scales from upper angle of gill-opening to caudal base *ca.* 130; those between origin of 2nd dorsal and lateral line 12.

The present specimen well agrees with the description given by JORDAN and THOMPSON with the exception of dentition; palatine and vomerine teeth seem to be absent. The number of the teeth of the upper jaw is 15 on each side; that of the dentary teeth is 26 (left) and *ca.* 23 (right). They have extremely fine serrations as in *P. pellucidus*. The arrangement of the dentary teeth is suggestive of *Tetragonurus*.

The tongue is very broadly rounded, whitish, and slightly concave dorsally. The inner side of the gill-cover is blackish; the palate is slightly dotted with black.

Remarks: This species has hitherto been recorded from Okinawa, Tokyo Bay, off Hagi (Yamaguchi Prefecture) and Southern California*. It is highly probable that *ischanus* represents adult stages of *pellucidus*.

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C. *Icosteus aenigamaticus* LOCKINGTON "Irezumi-kon-nyaku-aji", new Japanese name

i. A specimen from off Ōya-mura (fig. 3). This specimen was collected by Mr. Chikashi NAKAMURA, Chief of the Kesen-numa Branch Station, Miyagi Prefectural Fisheries Experimental Station, Kesen-numa. It was taken by a trap net off Ōya-mura, Miyagi Prefecture, on June 20, 1952. The total length is 258 mm, and the standard length 222 mm. The following measurements are given in hundredths of the standard

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* After this paper went to press, another specimen of *P. ischanus* was rceived from Mr. Kaneo SUGAWARA. It was caught by a boy on July 12, 1953, in a sandy pool in the intertidal zone at Nagaura-machi, Chiba Prefecture (Tokyo Bay). The total length is 200 mm. The color of the body is much darker than in the specimen from Ōya-mura.

length: Greatest depth of body (at hind margin of appressed pectoral fin) 41.0, greatest breadth of body (at pectoral base) 14.9, least depth of caudal peduncle 7.6, length of head 23.4, diameter of orbit 4.1, interorbital breadth (above centers of eye) 11.3, length of snout 7.7, length of longest pectoral fin-ray 12.4, length of longest ventral fin-ray 8.3, length of longest dorsal fin-ray 11.7, length of longest anal fin-ray 11.7, length of longest caudal fin-ray 16.2.

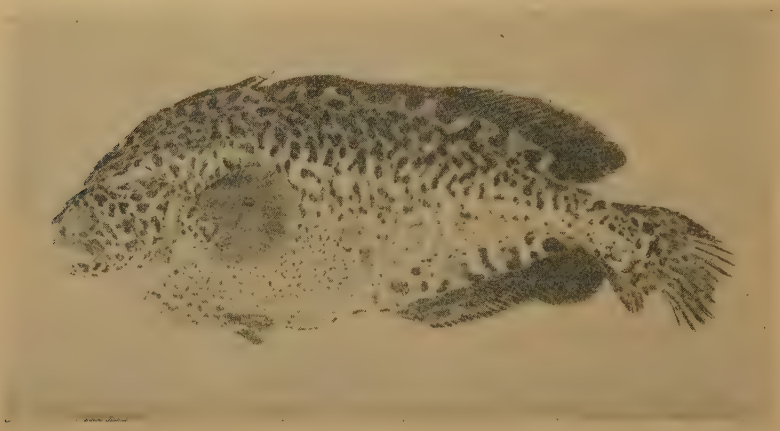

Fig. 3. *Icosteus aenigmaticus* LOCKINGTON from off Ōya-mura, northern Japan. Total length 258 mm.

D. 55; A. 39; P. 21 on both sides; V. 5 on both sides; C. viii/9/8/ix. Pseudobranchiae well developed. Gills 4; a slit behind 4th gill-arch. Branchiostegals 6 on both sides. Gill-rakers on 1st arch 6/1/10 (left) and 6/1/9 (right). Lateral line with 2 rows of small spines.

The present specimen well agrees with the description given by Dr. CLEMENS and Mr. WILBY [1946 (1949)], and it is thought unnecessary to present further account.

ii. A specimen from Manazuru. Early in the morning of April 27, 1953, a smaller example of *Icosteus aenigmaticus* was taken by a trap net for *Seriola* and *Trachurus* near Manazuru, Kanagawa Prefecture. Mr. Masaji HIRAI, Manazuru Branch Station, Tokaiku Suisan Kenkyujo, collected the specimen, and presented it to the writer. The surface temperature near the net at 10 a.m. was 15°.7 C, and the temperature at 40 m depth was 15.°8 C, according to his regular records. The specimen (Cat. No. 9007, ABE) measures 151 mm in total length, and 128 mm in standard length. The black markings of the body are relatively much larger and less numerous, and the posterior half of the body is much thinner than in the specimen from Ōya-mura; otherwise, the former specimen mostly well agrees with the latter specimen.

D. 52; A. *ca.* 34; P. 20 on both sides; V. 5 on both sides; C. *ca.* vi/10/8/*ca.* viii. Pseudobranchiae well developed; gills 4; a slit behind 4th gill-arch; branchiostegals 6 on both sides; gill-rakers on 1st arch 6/1/9 or 10 on right side, ?/1/10 on left side.

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雜　錄　Ichthyological Notes

雄と思はれるものが雌に寄生していたオキアンコオ〔A record of an adult female with a supposedly parasitic male of *Cryptopsaras couesi* from the Pacific coast of northern Japan〕

1953年5月18日頃，宮城縣気仙沼市と青森縣八戸市間の距岸50浬，水深450米以浅の水域で，オキアンコオ（別名イサリアンコオ）*Cryptopsaras couesi* Gill（時々誤つて *Cryptosparas* と書かれた事がある）の雌の成魚が1尾宮城縣本吉郡大島村の底曳船大平丸に依つて漁獲された。此の雌は全長（口を閉じて吻端から尾鰭の上から数えて第4番目の軟条後端迄）435粍，標準体長276粍あり，体の右側，胸鰭基部の下方で腹中線に近い所に全長約15粍，標準体長約12粍の本種の矮雄と思われる魚が頭端を以て癒着している。

オキアンコオを含むミツクリエナチガヨオチンアンコオ亜目では矮雄が雌に寄生している例は近年多く知られて来て居り，オキアンコオに極めて近縁のミツクリエナガチヨオチンアンコオ *Ceratias mitsukurii* Tanaka ではその一例が相模湾から報告された事がある（採集者は Owston 氏，全長440粍，1907年5月採，報告は田事茂穂先生1908年）。然しオキアンコオそのものの本邦からの報告はあるが（大島正満博士，1936年，秋田縣土崎沖產，全長21粍．黒沼勝造博士，1941年，駿河湾戸田沖水深約300米，全長8粍，1940年6月6日採．今井貞彦教授，1942年，駿河湾，ビームトロールで1500米ワイヤーを出して採集，全長2.3粍，1940年10月21日採），今回のように大形な雌で而かも雄と思はれるものが寄生している例は恐らく本種にとつては始めての事と思はれる。尚上記2種に近縁のもので本邦から報告されているものには，コブアンコオ（新称）*Ceratias caruncu-latus* Günther（Challenger 号東京南方から採集）とノオマンアンコオ *Cryptopsaras normani* Regan et Trewavas（今井教授駿河湾から報告）があり，1951年12月28日発行された Bertelsen の "The ceratioid fishes" ではミツクリエナガチオヨチンアンコオと共に上記のものはすべてオキアンコオと同一種であると見做されている。（阿部宗明・中村捷）

Around May 18, 1953, an adult female with a supposedly parasitic male of *Cryptopsaras couesi* Gill was caught by a trawler, "Taihei-maru", from the water between Hachino-e (Aomori Prefecture) and Kesen-numa (Miyagai Prefecture) and not farther than 50 miles from the shore. The depth of the fishing ground was less than 450 m. The female measures 435 mm in total length measured from the anterior end of the upper jaw (mouth closed) to the posterior tip of the 4th caudal fin-ray (counted from top). The supposedly parasitic male fused at the anterior end to the right side of the female (below the pectoral base, and near the mid-ventral line) is *ca.* 15 mm in total length. These specimens have been deposited in Miyagiken Ken-hoku Suisan-Kagaku Hakubutsukan (meaning prefectural fisheries museum for the northern part of Miyagi Prefecture), Kesen-numa.

The female measures 276 mm in standard length. The following mesurements are given in hundredths of the standarad length: Length of head 49.6, greatest depth of body (at anterior end of pectoral base) 52.2, greatest breadth of body (a short disatnce in advance of anterior margin of gill-opening) 13.8, least depth of caudal peduncle 10.9, length of upper jaw 17.9, diameter of eye (horizontal) 1.1, least breadth of bony interorbital 4.7, length of visible portion of tentacle *ca.* 69.6*, length of largest caruncle (on mid-dorsal line) 6.5, length of left caruncle 4.0, length of right caruncle 3.6, length of whip-shaped projection of esca 2.2.

D. I, 4 (all unbranched); A. 4 (2nd ray bifid); P. 15 on both sides (all unbranched); C. 8 (ii+4+ii); V. absent.

The body is soft, compressed, and coalblack excepting for the fin-membranes and the most part of the tentacle. The fin-membranes are extremely thin and almost colorless. The main body of the esca is coalblack, ~~and~~ ellipsoid, and bears a pale whip-shaped appendage at its distal end and a few, much shorter, pale appendages at the base of the former. The lining of the buccal cavity is blackish. The lips are thick. There is a weak conical projection at the symphysis. The teeth of the both jaws are arranged rather irregularly, mostly in 2 rows, the outer teeth being much smaller on the lower jaw. Vomerine teeth are few in number; there are no teeth near the median line of the vomer. The caruncles are 3 in number, the median one being the largest. They are each provided with a pale pore on the distal surface. In front of the median caruncle is a pit; the disatnce between them is a little smaller than the length of the right caruncle.

The skin is covered with extremely fine shagreen, and scattered with pale minute pits, each of which is surrounded by a black ring. The left ovary is curved, directing its anterior end towards the vent; the right ovary is stretching forwards lying ventrally to the alimentary canal. The eggs are very small, measuring *ca.* 0.2-0.3 mm in diameter.

The supposedly parasitic male measures *ca.* 12 mm in standard length. The following measurements are given in hundredth of the standard length: Greatest depth of body *ca.* 28.3, legnth of head *ca.* 58.3 (left) and *ca.* 47.5 (right), greatest breadth of body *ca.* 16.7, least depth of caudal peduncle *ca.* 8.3, diameter of eye *ca.* 6. 7, greatest depth of produced mouth part *ca.* 29.2.

The body is anteriorly cylindrical, and compressed posteriorly. The caudal fin is well developed with a few fin-rays; the pectoral fin is distinct, but seems to be a shrunken whitish appendage; the dorsal and anal fins are each represented by a very low whitish fold; the ventral fin is lacking. The color in formalin is much lighter than in the female mentioned above, the snout, drosal part of head, and fins being whitish; there is an indistinct vertical dark bar at the base of the caudal fin.

The eyes are comparatively much larger than in the female. The iris is white.

(Tokiharu Abe and Chikashi Nakamura)

* The writers have not dissected the back near the basal bone. The hind margin of the base of the visible part of the tentacle is just above the anterior rim of the eye.

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